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BUREAU OF MINES

H. FOSTER BAIN, DIRECTOR

ANALYSES OF MINE AND CAR SAMPLES OF COAL
COLLECTED IN THE FISCAL YEARS
1916 TO 1919

BY

ARNO C. FIELDNER, WALTER A. SELVIG

and J. W. PAUL



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ANALYSES OF MINE AND CAR SAMPLES OF COAL
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1916 TO 1919

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ANALYSES OF MINE AND CAR SAMPLES OF COAL COLLECTED IN THE FISCAL YEARS 1916 TO 1919.

By ARNO C. FIELDNER, WALTER A. SELVIG, and J. W. PAUL.

SAMPLING AND ANALYTICAL METHODS.

By ARNO C. FIELDNER.

INTRODUCTION.

Many mine samples of coal are analyzed each year in the laboratories of the Bureau of Mines. The analyses are made in connection with investigations relating to fuels belonging to or for the use of the United States Government, the causes of accidents in coal mines, the geologic relations of coal beds, and the quality and the value of the coal and lignite in the public lands. The systematic collection and analysis of such samples in connection with fuel investigations was begun in 1904 at the Government fuel-testing plant at the Louisiana Purchase Exposition, and was under the direction of the United States Geological Survey for six years. Descriptions of the coal samples collected between the beginning of this work, July 1, 1904, and the transfer of the fuel-testing and mine-accident investigations to the Bureau of Mines, July 1, 1910, were compiled and published in Bureau of Mines Bulletin 22.¹ Descriptions and analyses of samples collected during the fiscal years 1911 to 1913 were published in Bureau of Mines Bulletin 85.² Descriptions and analyses of samples collected during the fiscal years 1913 to 1916 were published in Bureau of Mines Bulletin 123.³

The present bulletin presents analyses and descriptions of samples collected during the fiscal years 1916 to 1919. In order that the material in this bulletin may be used to supplement that presented in Bulletins 22, 85, and 123, the same plan of geographical classi-

¹ Lord, N. W., and others, Analyses of coals in the United States, with descriptions of mine and field samples collected between July 1, 1904, and June 30, 1910: Bull. 22, Bureau of Mines, 1912, 1,200 pp. (In two parts.)

² Fieldner, A. C., and others, Analyses of mine and car samples of coal collected in the fiscal years 1911 to 1913: Bull. 85, Bureau of Mines, 1914, 444 pp.

³ Fieldner, A. C., and others, Analyses of mine and car samples of coal collected in the fiscal years 1913 to 1916: Bull. 123. Bureau of Mines, 1918, 478 pp.

fication has been followed, the analyses and descriptions of the samples being grouped in alphabetical order according to the State, county, and town near which the mines or prospects sampled are situated.

ACKNOWLEDGMENTS.

Special acknowledgment is due to G. O. Smith, Director of the United States Geological Survey, and to M. R. Campbell, geologist in charge of the economic geology of fuels, for furnishing field descriptions of those samples collected by the geologists of the Survey.

A number of the mine samples from Maryland were collected under the direction of E. B. Mathews, director of the Maryland Geological Survey.

A number of the mine samples from Illinois were collected under the direction of F. W. De Wolf, director of the Illinois Geological Survey.

The collection of samples by the fuel-inspection section of the Bureau of Mines was under the direction of G. S. Pope, engineer. Samples designated by the letter W preceding the laboratory number were analyzed in the Washington laboratory of the bureau under the direction of J. D. Davis, chemist, and H. M. Cooper, chemist.

The collection of mine samples and the gathering of mine data by the field engineers of the Bureau of Mines were under the direction of G. S. Rice, chief mining engineer of the bureau, who also reviewed the description of the method of field sampling. The descriptions of the mines and the sections of the coal beds were compiled by J. W. Paul, chief coal-mining engineer of the bureau, assisted by Hattie R. Sondheim, clerk, and Samuel Sanford, engineer. The chemical analyses were made under the direction of A. C. Fieldner, chemist, and W. A. Selvig, assistant chemist, who were assisted by F. D. Osgood, assistant chemist; V. C. Allison, L. E. Ashim, C. L. Boyle, O. C. Brown, W. R. Collette, C. W. Davis, H. A. Depew, L. R. Eckman, I. S. Guest, S. A. Harris, H. H. Hill, Wm. Hoffman, B. B. Kaplan, C. R. Locke, G. H. Mengel, G. E. Postma, J. I. Prest, C. S. Purcell, W. C. Ratliff, and B. B. Wescott, junior chemists; W. E. Surbled, laboratory assistant; and A. D. Bauer, Morris Block, W. E. Demby, M. D. Gladstein, J. B. McGrael, J. Schlesinger, and P. D. Watson, laboratory helpers. The assistant and junior chemists and laboratory helpers were analyzing coal samples for varying lengths of time, ranging from one month to three years. The computing of the analyses at the Pittsburgh laboratory was under the direction of R. A. Wood, assistant engineer.

COLLECTION OF SAMPLES.

Samples designated by the letter A in the table of analyses were collected by representatives of the Bureau of Mines, in connection with the investigation of fuels belonging to or for the use of the Government, and with investigations of accidents in coal mines.

The samples designated by the letter B in the table of analyses were collected by the United States Geological Survey in connection with the study of the geologic relations of the coal beds and the classification of public lands. Under this designation are also included a number of samples collected by the State geological surveys of Illinois and Maryland.

METHOD OF MINE SAMPLING FOLLOWED BY BUREAU OF MINES.

The method of collecting mine samples by the Bureau of Mines involves selecting a representative face of the bed to be sampled; cleaning the face; making a cut across it from roof to floor, and rejecting or including impurities in this cut according to a definite plan as they are included or excluded in mining operations; reducing this gross sample, by crushing and quartering, to about 3 pounds; and immediately sealing the 3-pound sample in an air-tight container for shipment to the laboratory.⁴

COLLECTION OF CAR SAMPLES.

The carload lots of coal shipped to Pittsburgh for test were sampled by taking definite quantities of coal at regular intervals from a car as it was unloaded, and by reducing to convenient size (about 50 pounds) the gross sample thus obtained. The method of collecting and reducing car samples is given in detail in Bureau of Mines Bulletin 116.⁵

METHOD OF SAMPLING FOLLOWED BY THE UNITED STATES. GEOLOGICAL SURVEY.

In collecting mine samples the Geological Survey followed essentially the same method of sampling as that used by the Bureau of Mines. However, in sampling outcrops and prospect holes or country banks when mining is not in progress, the geologist can not imitate the miner in rejecting or including impurities in the sample, and hence the sample from the cut across the bed includes all partings or bindings less than three-eighths of an inch thick and every concretion or "sulphur ball" having a maximum diameter of less than 2 inches and a thickness of less than one-half inch. All other impurities in the bed are excluded from the sample. Obviously an

⁴ Holmes, J. A., The sampling of coal in the mine: Tech. Paper 1, Bureau of Mines, 1911, 18 pp.

⁵ Pope, G. S., Methods of sampling delivered coal, and specifications for purchase of coal for the Government: Bull. 116, Bureau of Mines, 1916, 64 pp.

arbitrary and uniform system of rejecting impurities is necessary for sampling outcrops, prospects, and undeveloped mines.

RELATION OF MINE SAMPLES TO COMMERCIAL SHIPMENTS.

In comparing analyses of mine samples and those of coal shipped from a mine due allowance must be made for the larger proportion of impurities that may be included in the commercial operation of the mine. It is difficult in taking a mine sample to reject impurities exactly as the miner rejects them. The practice of different miners varies, especially if rigid inspection at the tippie is not enforced. In some mines, for instance, where the coal bed has friable partings or has a soft, flaky roof or floor, the inclusion of some foreign matter is unavoidable. Hence the analysis of the mine sample usually indicates a better grade of coal as regards ash content and heating value than the actual commercial shipments, and for this reason the mine sample should be considered as representing the coal that can be produced only under the most favorable conditions of mining and preparation.

In commercial shipments that are sampled at their destination, the moisture content may be either more or less than that in the mine samples, the relative proportions depending on the amount of bed moisture, the size of the coal, and the weather conditions during transit.

Coals containing 5 per cent or more of moisture tend to lose moisture while in transit, provided no rain or snow falls. Slack coal usually contains more moisture than the mine sample. Low-moisture coals shipped in open cars may gain or lose moisture, according to the weather conditions.⁶

The calorific value, referred to moisture-free and ash-free coal, of samples taken from shipments at destination, tends to be slightly lower than that of the fresh mine samples from the same mine. The deterioration is caused mainly by absorption of oxygen from the air by the freshly exposed surfaces of coal. The rate of deterioration varies with the different types of coal and depends on a number of factors, chief of which are: (1) Size of coal, (2) proportion of surface exposed to circulating air, (3) duration of exposure, (4) temperature and humidity.

It is therefore difficult to assign any definite values for deterioration of coal while in transit.⁷ A number of mine and car samples tested

⁶ For a comparison of the moisture, ash, and sulphur contents of mine and car samples tested at the United States fuel-testing plant, St. Louis, Mo., see Burrows, J. S., *The importance of uniform and systematic coal-mine sampling*: U. S. Geol. Survey Bull. 316, 1907, pp. 490-560. For a discussion of moisture in coal deliveries, see Pope, G. S., *Sampling coal deliveries*: Bull. 63, Bureau of Mines, 1913, p. 12.

⁷ For data on deterioration of coal, see Porter, H. C., and Ovitz, F. K., *Deterioration and spontaneous combustion of coal in storage, a preliminary report*: Tech. Paper 16, Bureau of Mines, 1912, 14 pp.; Porter, H. C., and Ovitz, F. K., *Deterioration in the heating value of coal during storage*, Bull. 136, Bureau of Mines, 1917, 36 pp.; Parr, S. W., and Wheeler, W. F., *The weathering of coal*: University of Illinois Eng. Exp. Station Bull. 38, 1909.

by the United States Geological Survey and the Bureau of Mines showed the following average losses:

Average loss in moisture-free and ash-free calorific value of car sample as compared with that of mine sample.

Kind of coal.	Per cent.
Semibituminous, New River, and Pocahontas.....	0.1
Bituminous, Appalachian field.....	.3
Bituminous, Illinois, Indiana, and Missouri.....	.8
Subbituminous and lignite.....	1.3

ANALYTICAL METHODS.

The methods of analysis and the details of apparatus used by the Bureau of Mines in analyzing coal are fully described in Technical Paper 8⁸ of the Bureau of Mines. They are briefly summarized here, and certain changes in minor details, which are fully discussed in Technical Paper 76,⁹ are described.

PREPARATION OF LABORATORY SAMPLES.

Immediately after the sealed 3-pound can in which the sample is received at the laboratory has been opened, the contents are transferred to a weighed sheet-metal pan, spread out to a depth of 1 inch, and at once weighed. The pan containing the sample is placed in a large drying oven in which a temperature of 30° to 35° C. is maintained. Through this oven a current of warm air is made to flow by means of an ordinary desk fan mounted on top of the oven, and the sample is dried until the loss in weight between two successive weighings, made 6 to 12 hours apart, does not exceed 0.5 per cent. The total loss of weight is reported as "air-drying loss."

Immediately after the last weighing has been made the entire sample is quickly pulverized to 10-mesh size by being passed through a roll crusher. After having been mixed, the 10-mesh material is reduced with a riffle sampler to 500 grams. This 500-gram part is at once transferred to the porcelain jar of an Abbé ball mill, which is sealed air-tight and rotated at the rate of 60 revolutions per minute until the coal is pulverized to 60-mesh size.

This 60-mesh coal is emptied on a one-half-inch screen, which is vigorously shaken to detach the coal from the pebbles. The sample (approximately 500 grams) is then reduced to the final laboratory sample of approximately 60 grams by successive halvings with a small riffle sampler. The final sample is put through the 60-mesh sieve, and at once transferred to a 4-ounce wide-mouthed bottle, which is securely closed with a well-fitting rubber stopper. Any

⁸ Stanton, F. M., and Fieldner, A. C., Methods of analyzing coal and coke: Tech. Paper 8, Bureau of Mines, 1913, 42 pp.

⁹ Fieldner, A. C., Notes on the sampling and analyses of coal: Tech. Paper 76, Bureau of Mines, 1914, pp. 14-58.

particles of coarse material remaining on the sieve are carefully rubbed down to 60-mesh size on a bucking board and are thoroughly mixed with the sample in the bottle.

This air-dried sample is used in all analytical determinations.

DETERMINATION OF MOISTURE.

The residual moisture in the air-dried sample is determined by heating 1 gram in a shallow porcelain capsule, seven-eighths of an inch deep and $1\frac{3}{4}$ inches in diameter, for one hour at 105° C. in a constant-temperature oven through which a current of dry pre-heated air is rapidly passing. The air is dried by being passed through concentrated sulphuric acid. The covered capsule is cooled in a desiccator over sulphuric acid and then weighed. The loss in weight is called "moisture at 105° " in the air-dried coal.

ASH DETERMINATION.

The same sample is used for determining ash as was previously used for determining moisture. A porcelain capsule containing the sample is placed in a cool muffle and the temperature is gradually raised to approximately 750° C. The ignition in the muffle is continued, with occasional stirring of the ash, until all particles of carbon have disappeared. After the capsule containing the ash has been cooled in a desiccator it is weighed, and ignition is repeated until constant weight (0.0005 gram or less) has been attained.

The ash content as determined by this method represents the ignited mineral residue or "uncorrected ash."

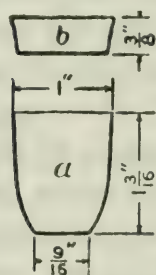


FIGURE 1.—10-c. c. platinum crucible for determining volatile matter.

DETERMINATION OF VOLATILE MATTER.

METHOD.

A 1-gram sample of the fine (60-mesh) coal is weighed into a bright, well-burnished, 10-gram (10 c. c.) platinum crucible, *a* (fig. 1), with a close-fitting capsule cover, *b*. The crucible and contents are heated to a temperature of 950° C. in a specially designed electric furnace of the vertical type (fig. 2). After having been heated exactly seven minutes the crucible is removed from the furnace, cooled, and weighed. The loss in weight minus the weight of moisture determined at 105° C. times 100 equals the percentage of volatile matter.

MODIFIED METHOD FOR LIGNITES AND SUBBITUMINOUS COALS.

Lignites and coals high in moisture are heated at a low temperature with a flame until all the moisture is driven out in order to avoid mechanical losses from material thrown out of the crucible by

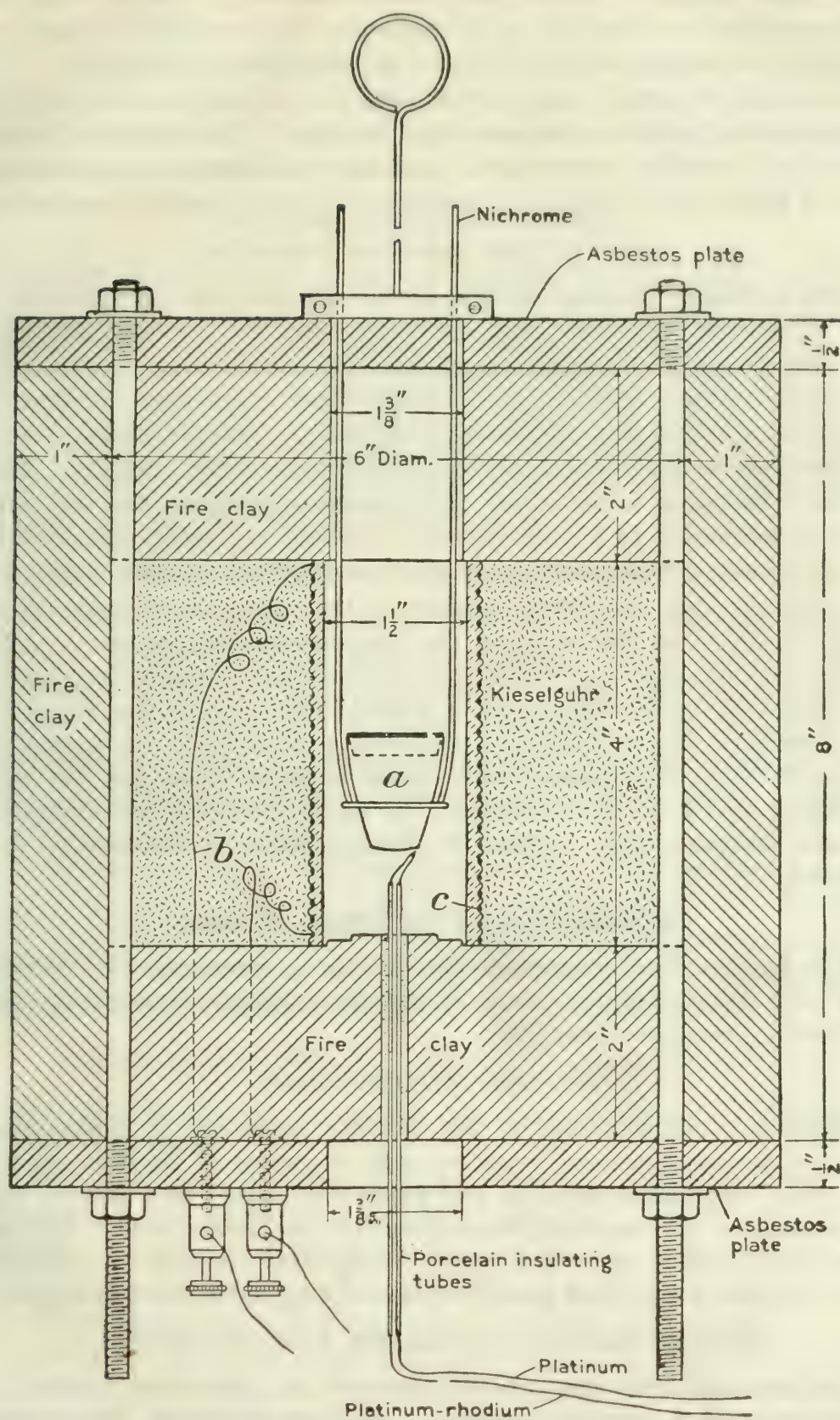


FIGURE 2.—Electric furnace for determination of volatile matter.

the rapid escape of steam and volatile matter.¹⁰ After this preliminary heating for four to six minutes the crucible is placed at once in the furnace at 950° C., and is heated for six minutes.

It should be clearly understood that the volatile matter does not represent any definite compound in the coal. The method of determination is wholly conventional, and any variation in temperature or rate of heating will change the amount of volatile matter determined.

USE OF THE ELECTRIC FURNACE.

Two specially designed electric furnaces of the vertical type (fig. 2) are connected in series and are controlled by a single rheostat. A current of 8 to 9 amperes is required to maintain the temperature of each furnace at 950° C. Under these conditions the drop in potential across the two furnaces is 60 volts. The life of the heating element under daily operation has been six to eight months. Each furnace contains a platinum and platinum-rhodium thermocouple that is connected to a millivoltmeter through a double-pole, double-throw switch. The position of the hot junction in each furnace is so adjusted that the direct reading of the temperature scale of the millivoltmeter is the same as the maximum temperature attained inside the crucible as determined by another standardized couple whose hot junction is in contact with the bottom of the interior of the crucible. In making this comparison a nickel cover perforated for admitting the thermocouple leads is substituted for the usual platinum cover of the crucible. To avoid possible contamination of the thermocouple, 1 gram of ignited silica or alumina is used instead of coal.

DETERMINATION OF FIXED CARBON.

The fixed-carbon content of the sample is determined by calculation—by subtracting the sum of the percentages of moisture, ash, and volatile matter from 100.

SULPHUR DETERMINATION.

Sulphur is determined by the Eschka method. A 1.3734-gram part of the air-dried coal is mixed with 6 grams of Eschka mixture in a No. 1 porcelain crucible and gradually heated in a muffle, with free access of air, until all the carbon has been consumed. The sulphur is extracted with hot water, completely oxidized to sulphate with bromine water, and precipitated and weighed as barium sulphate.

DETERMINATION OF CARBON AND HYDROGEN.

Carbon and hydrogen are determined by the usual method of combustion in a current of oxygen. A 0.2-gram part of the air-dried coal is burned in an electrically heated furnace of the Heraeus type.

¹⁰ Lord, N. W., Experimental work conducted in the chemical laboratory of the United States fuel-testing plant at St. Louis, Mo.: U. S. Geol. Survey Bull. 323 (reprinted as Bull. 28, Bureau of Mines), 1911, pp. 6-7.

Complete oxidation is insured by passing the products of combustion over red-hot copper oxide. A layer of lead chromate, following the copper oxide, removes the sulphur. The water and carbon dioxide are absorbed and weighed in calcium chloride and potassium hydroxide solution, respectively. No correction is made for carbon or hydrogen from inorganic matter in the coal.

NITROGEN DETERMINATION.

Nitrogen is determined by the Kjeldahl-Gunning method. One gram of the air-dried coal is digested with 30 c. c. of concentrated sulphuric acid, 0.5 gram of metallic mercury, and 5 grams of potassium sulphate until the carbon has been completely oxidized and all the nitrogen has been converted to ammonium sulphate. After dilution with water and precipitation of the mercury by the addition of potassium sulphide an excess of sodium hydroxide is added and the ammonia determined by distillation.

DETERMINATION OF CALORIFIC VALUE.

The heat of combustion is determined with the bomb calorimeter. One gram of the air-dried coal is completely burned in compressed oxygen gas, and the total heat evolved is absorbed in a weighed quantity of water in which the bomb is immersed. The rise in temperature of the water is measured with a thermometer that is graduated in hundredths of $1^{\circ}\text{C}.$, and can be read, by means of a cathetometer, to $0.002^{\circ}\text{C}.$

Corrections are made for "radiation losses," oxidation of nitrogen to aqueous nitric acid, and oxidation of sulphur dioxide to aqueous sulphuric acid. The calorific value obtained in this manner is the total heat of combustion with water vapor condensed to liquid water at the temperature of the calorimeter; that is, 20° to $25^{\circ}\text{C}.$

INTERPRETATION OF ANALYTICAL RESULTS.¹¹

The coal analyses reported in this bulletin are grouped in the usual manner, as follows:

1. The proximate analysis, including results of determinations of moisture, volatile matter, fixed carbon, and ash.
2. The ultimate analysis, including results of determinations of carbon, hydrogen, nitrogen, oxygen, sulphur, and ash.
3. The calorific value, heating value, or heat of combustion.

For many of the samples the analysis is given for three conditions, as follows: (1) As received at the laboratory, (2) computed to a moisture-free condition, and (3) computed to a moisture-free and ash-free condition.

¹¹ See also Fieldner, A. C., Notes on the sampling and analysis of coal: Tech. Paper 76, Bureau of Mines, 1914, pp. 23-57.

At mines where two or more samples were taken and a composite sample obtained by mixing equal portions of the separate samples, the analysis of the composite sample is given for the three conditions, because presumably the composite sample represents the coal in the mine better than any one of the separate samples.

The analysis of the sample "as received" (condition 1) represents the actual sample as received at the laboratory and, as for a mine sample, represents the coal at the point of sampling in the mine. The "moisture-free" analysis (condition 2) represents the relative composition and heating value of the dry coal; this form of analysis is convenient for comparing similar coals of variable moisture content. The "moisture-free and ash-free" analysis represents approximately the relative composition and calorific value of the dry organic or combustible matter. This form of analysis is only an approximation, because the ash does not have the same weight as the inorganic or incombustible matter in the coal. However, the error does not exceed 1.5 per cent in comparing coals that do not vary much in the character and amount of ash and sulphur.

PROXIMATE ANALYSIS.

The proximate analysis of coal originated in response to the industrial demand for laboratory tests of the relative amounts of certain compounds, either present in the coal or derived from it, that effect its use as a fuel. These compounds are grouped by the proximate analysis as follows:

(1) Water or moisture; (2) mineral impurities that remain in a somewhat altered condition, as ash when the coal is burned; (3) organic or combustible matter, which is approximately represented by the volatile matter and fixed carbon.

MOISTURE CONTENT.

The moisture in coal consists of (1) extraneous moisture, which comes from external sources, such as underground waters trickling over the face of the coal bed, through the coal bed, and, in places going down the dip, from the coal shot down lying in water, condensation from saturated mine air, or, as regards car samples, from atmospheric precipitation or from water used for washing the coal, and (2) inherent moisture, which is one of the products of the original vegetable matter from which coal is derived.

Analysis does not differentiate between extraneous and inherent moisture, because in air-drying coal not only is the extraneous or superficial moisture removed but also more or less of the inherent moisture, the amount depending on the fineness of the coal and the humidity of the air. The percentage loss of weight on air drying

should be regarded merely as an indication of the relative tendency of different coals to lose moisture, after removal from the mine, on exposure to comparatively dry atmospheres.

The loss of weight on air drying at 30° to 35° C., combined with the loss of weight occurring when the air-dried sample is heated in a current of dry air at a temperature of 105° C., is considered equal to the total moisture in the coal as received at the laboratory.

ASH.

Ash is the incombustible residue left from complete combustion of the coal. It is derived from the inorganic matter in the coal, and is composed largely of compounds of silica, alumina, lime, and iron, together with smaller quantities of magnesia, titanium, and alkali compounds. The silica, alumina, and titanitic oxide are derived from sand, clay, shale, and "slate"; the iron oxide mainly from iron pyrite; and the lime and magnesia from their corresponding carbonates and sulphates.

The ash-forming constituents consist of (1) "inherent" or "intrinsic" impurities that are present in an intimate mixture with the coal substance, and are derived either from the original vegetable material or from external sources during the accumulation of coal-forming plant remains; (2) impurities formed either during the laying down of the coal bed or subsequently, which occur in the form of partings, "veins," and nodules of clay, shale, pyrite, and calcite; and (3) impurities that become mechanically mixed with the coal in the process of mining, such as fragments of roof and floor.

INHERENT IMPURITIES.

The percentage of ash derived from the intimately mixed impurities may be determined by selecting a sample of clean lumps of homogeneous coal, or, better, by placing the coarsely crushed coal in a solution of calcium or zinc chloride with a specific gravity of 1.35. The coal will float and the heavier extraneous impurities will sink. In this way a sample of clean coal may be prepared for analysis. In some samples the percentage of "intrinsic" ash is so low that the ash must have come exclusively from the original coal-forming vegetation. Certain coals have deposited in their minute joints or cleavage planes thin flakes of calcite, gypsum, silica, or clay, and some have veinlets of pyrite. These impurities are not intimately mixed with the coal substance, but can not be separated from the coal by any commercial methods of preparation. In some coals, also, microscopic crystals of pyrite are so distributed that washing does not appreciably lower the sulphur content.

EXTRANEOUS IMPURITIES.

The percentage of ash derived from extraneous impurities varies considerably, depending on the number and size of the partings in the bed, the possibility of separating them from the coal, and the care with which the coal is mined. Such impurities of this character, when in the form of "slate" or bone, may be removed to some degree by suitable methods of washing, picking, or screening. The possibility of improving the quality of coal by washing may be determined by the laboratory float-and-sink test already described.

Coal ash, as determined, usually weighs less than the organic matter from which it is produced because of the loss of volatile constituents during ignition. Shale and clay lose their water of hydration; the carbonates are more or less decomposed, giving off carbon dioxide, and the iron pyrite is changed to ferric oxide, giving off sulphur dioxide, either to the atmosphere or to the free calcium oxide that has been formed from the carbonate. In coals containing calcium carbonate a large proportion of the sulphur may be retained in the ash as calcium sulphate.

VOLATILE MATTER AND FIXED CARBON.

The volatile matter and fixed carbon represent approximately the relative proportions of gaseous and solid combustible matter that are obtained from coal by heating it in a closed vessel. The volatile matter consists chiefly of the combustible gases hydrogen, carbon monoxide, and methane and other hydrocarbons, and some non-combustible gases, as carbon dioxide and water vapor. The volatile matter does not include the water that can be removed from the coal by heating it at 105° C.

From the standpoint of the analyst, 950° to 1,000° C. appears to be the best temperature for the determination of volatile matter, as most duplicate determinations made within those limits agree within 0.5 per cent.

The residue of coke left in the crucible after the ash has been deducted is reported as "fixed carbon." The fixed carbon does not represent the total carbon in the coal, for a considerable part of the carbon is expelled as volatile matter, being in combination with hydrogen as hydrocarbon or with oxygen as carbon monoxide and carbon dioxide. Furthermore, fixed carbon is not pure carbon. The carbonized residue contains, in addition to the ash-forming constituents, several tenths per cent of hydrogen and oxygen, from 0.4 to 1.0 per cent nitrogen, and approximately half the sulphur that was in the coal. The terms "volatile matter" or "volatile combustible matter" and "fixed carbon" do not represent definite compounds that existed in the coal before heating. The method of determination

is arbitrary, and results are comparable only when the temperature and rate of heating are the same. In general the sum of the fixed carbon and ash may be taken as representing the relative amount of coke yield from coking coals. However, the conditions under which the laboratory determination is made are so different from the conditions in the commercial manufacture of coke or gas that no close agreement can be expected. The slow rate of heating in the industrial processes yields several per cent more coke than is obtained in the laboratory determination.

SULPHUR.

In the proximate analysis of coal the sulphur is included in the volatile matter, fixed carbon, and ash. If the ash contains no lime or alkali oxides, all the sulphur is distributed between the volatile matter and fixed carbon, approximately half the sulphur being retained by the fixed carbon and the remainder escaping with the volatile matter.

FORMS OF OCCURRENCE IN COAL.

Sulphur occurs in coal (1) as pyrite or marcasite, (2) as sulphate of iron, lime, and alumina, and (3) in combination with the coal substance as organic compounds.

In some coal beds the balls, lenses, and bands of pyrite are easily distinguishable in the face of the bed, and may be largely removed by breaking up the lumps of coal containing them and by suitable washing or picking. In other beds the pyrite is disseminated throughout the lumps of coal in veinlets or in such small particles that it is not practicable to separate them from the lump coal or even to remove them from the screenings by washing.

Sulphur combined as sulphates of iron, lime, and alumina may be found in weathered coal. On exposure to air, pyrite and marcasite tend to absorb oxygen and form iron sulphate. Sulphur combined as sulphate has no heating value.

Next to pyritic sulphur the most prominent form of sulphur in coal is that which occurs in some organic combination with the coal substance; indeed many coals contain one-half or more of their sulphur in this form. Powell and Parr¹² have recently developed a method for directly determining the relative amounts of pyritic sulphur in coal. This method has been tested in the Bureau of Mines laboratory and found to give accurate results with a number of coals selected from the Appalachian and interior-province coal fields.¹³

¹² Powell, A. R., and Parr, S. W., A study of the forms in which sulphur occurs in coal: University of Illinois, Engineering Experiment Station Bull. 111, 1919, pp. 44-45.

¹³ Powell, A. R., The analysis of sulphur forms in coal, Tech. Paper 254, Bureau of Mines, 1921, 21 pp.

ULTIMATE ANALYSIS.

In the ultimate analysis the composition of coal is expressed in percentages of ash, sulphur, carbon, hydrogen, nitrogen, and oxygen. The sum of these constituents is taken as equal to 100 per cent. As there is no simple direct method for the determination of oxygen, it is estimated by subtracting the sum of the other five constituents from 100. This method throws the summation of all the errors incurred in the other determinations upon the oxygen.

The determination of carbon, hydrogen, and nitrogen, although requiring experience and a considerable degree of skill on the part of the chemist, is not subject to the arbitrary conditions that must be maintained in the proximate analysis. As the chemist is dealing with definite chemical elements, he should be able to make duplicate determinations, agreeing within the following limits: Carbon, 0.3 per cent; hydrogen, 0.07 per cent; nitrogen, 0.05 per cent.

CALORIFIC VALUE.

The most accurate method of determining the total heating value is by combustion in a bomb calorimeter. The instrument should be carefully standardized by burning substances of known calorific value, such as the standard samples of cane sugar, naphthalene, and benzoic acid, that are now being furnished by the Bureau of Standards. The standardization should be conducted under exactly the same conditions and with the same thermometer that is used in the tests. The use of calibrated thermometers is essential. In carefully conducted calorimetric work the probable error should not exceed 0.2 per cent, which corresponds to about 30 B. t. u. in a high-grade coal. This degree of accuracy is higher than can be obtained in the usual methods of sampling, the error introduced by which oftentimes increases the total error to 100 B. t. u.

DESCRIPTIONS OF SAMPLES.

The samples of coal and the mines from which they were taken are described in the same general manner as the corresponding information was presented in Bulletin 22. The descriptions have been compiled from published reports or from the note books of the engineers or geologists who collected the samples, and they necessarily vary in completeness. The purpose of the descriptions is to present such information as bears on the significance of the analyses and to give supplementary details, such as methods of mining and cleaning coal, that may be of assistance to Government engineers or purchasing agents and to other persons in preparing specifications and awarding contracts for fuel.

The names of the coal beds, geologic formations, mining districts, and coal fields are those used by the United States Geological Survey. In the descriptions of the sections of coal beds, the word "shale" has been substituted for the "slate" of collectors and "bony coal" or "bone" for "bone coal."

CLASSIFICATION OF COAL.

The usage of the Survey has been followed also in the classification of the coals. The following statement on coal classification is made by Campbell ¹⁴ in a recent report:

The classification of coal into various grades, such as bituminous, semibituminous, and lignite, is arbitrary and not at all satisfactory, but it is in common use in the United States, and it seems desirable to give the class for each sample, because from the analysis one could not always determine this important point. The classes generally used in the United States are as follows: Anthracite, semianthracite, semibituminous, bituminous, subbituminous, and lignite.

Anthracite.—Anthracite is generally well known, but in a systematic classification it is generally defined as a hard coal having a fuel ratio (fixed carbon divided by volatile matter) of not less than 10. Most of this coal comes from the anthracite fields of eastern Pennsylvania, but small areas are known in some of the Western States.

Semianthracite.—Semianthracite coal has a fuel ratio ranging from 6 or 7 to 10. There is only a small amount of this coal in the United States.

Semibituminous.—Semibituminous coal is of great commercial importance, but is not widely distributed. Its fuel ratio ranges from 3 to 6 or 7. It is the best steam coal in the country, and some of it can be utilized in the manufacture of coke. The centers of production are the Pocahontas and New River fields of Virginia and West Virginia, Georges Creek field of Maryland, Windber field of Pennsylvania, and the western end of the Arkansas field in the vicinity of Fort Smith. Though small areas containing this grade of coal have been found in Washington and Colorado, the amount of such coal in these fields is small.

Bituminous.—Bituminous coal is the most important grade in the country and includes most of the coals east of the Rocky Mountains. In the Western States there are large areas of bituminous coal, such as the Trinidad-Raton field of Colorado and New Mexico; the Grand Hogback field of Colorado; the Book Cliffs field of Utah; the Rock Springs, Kemmerer, and Black Hills fields of Wyoming; the Great Falls field of Montana; and many districts of Washington. This grade furnishes most of the coking coal of the country, and it is largely sold for steam raising and for domestic use.

Subbituminous.—The term "subbituminous" has been adopted by the United States Geological Survey for what has generally been called "black lignite." The latter term is objectionable, for the reason that the coal is not lignitic in the sense of being woody, and the use of the term seems to imply that the coal is little better than the brown, woody lignite of North Dakota, whereas many of the coals of this class closely approach the lowest grade of bituminous coal. In fact, it is extremely difficult to separate this class from the one below and the one above. It is generally distinguished from lignite by its color and freedom from apparent woody texture and from bituminous coal by the slacking it undergoes when exposed to the weather. As the latter is an important difference in commercial use, it has been adopted by the Geological Survey as the criterion for the separation of subbituminous and bituminous coals.

¹⁴ Campbell, M. R., Analyses of coal samples from various fields in the United States: U. S. Geol. Survey Bull. 541, 1914, pp. 491-526.

Subbituminous coal is found in most of the western fields, being well known in the field about Boulder and Denver and in North Park, Colo.; Gallup, N. Mex.; Hanna, Douglas, Sheridan, and the Bighorn Basin, Wyo.; Red Lodge and Musselshell, Mont., and in many of the districts of Washington and Oregon.

Lignite.—As used by the Geological Survey the term “lignite” is restricted to the coals that are distinctly brown and generally woody. They are intermediate in quality between peat and subbituminous coal. Lignite is abundant in the North in eastern Montana and North Dakota and in the northwest corner of South Dakota. In the South it is present in all of the Gulf States, but it has been developed commercially only in Texas.

TABULATED ANALYSES.

On the following pages are given the analyses of the samples of coal collected during the period covered by this report.

In the first column of the table, locations of samples are, for brevity, not worded as in the detailed descriptions (pp. 108 to 352).

Table of chemical analyses.

Locality, bed, etc.	Mine notes <i>a</i> (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ALABAMA.																
BIBB COUNTY.																
Belle Ellen; Belle Ellen mine, Youngblood bed (face of 19 south heading).	108	26276	A	1	2.72	34.74	57.87	4.67	1.33					1.6	7,899	14,218
Same (face of 22 north heading).	108	26277	A	1	2.70	35.60	55.99	5.71	1.41					1.5	7,824	14,083
Same (face of 2 crosscut, 23 north heading).	108	26278	A	1	2.58	35.66	56.16	5.60	1.27					1.4	7,791	14,024
Same (face of 70 room, 18 north heading).	108	26279	A	1	2.54	34.91	57.72	4.83	1.17					1.5	7,927	14,269
Same (face of 19 north heading).	108	26280	A	1	3.39	33.08	58.59	4.94	1.48					2.3	7,857	14,143
Same (composite of samples 26276 to 26280).	108	26281	A	1	2.71	34.67	57.43	5.19	1.26	5.29	79.71	1.42	7.13	1.7	7,865	14,157
				2		35.64	59.03	5.33	1.30	5.13	81.63	1.46	4.85		8,084	14,551
				3		37.65	62.35		1.37	5.42	86.54	1.54	5.13		8,539	15,870
JEFFERSON COUNTY.																
Bessemer, 7 miles southwest of; Virginia mine, Nickel Plate bed (face of 1 north heading, about 6,300 feet northwest of mine mouth).	109	26217	A	1	1.91	24.88	68.53	4.68	.91					1.5	8,172	14,710
Same (face of 19 right heading, about 7,400 feet northwest of mine mouth).	109	26218	A	1	2.72	24.46	68.03	4.79	.70					2.2	8,065	14,517
Same (face of 20 right heading, about 6,000 feet northwest of mine mouth).	109	26219	A	1	2.41	23.93	69.05	4.61	.72					1.9	8,135	14,643
Same (face of 17 right heading, about 6,600 feet northwest of mine mouth).	109	26220	A	1	2.52	25.52	67.11	4.85	.60					2.0	8,049	14,580
Same (composite of samples 26217 to 26220).	109	26221	A	1	2.39	24.41	68.41	4.79	.74	4.74	81.74	1.48	6.51	1.9	8,134	14,623
				2		25.01	70.08	4.91	.76	4.59	83.74	1.52	4.48		8,333	14,981
				3		26.30	73.70		.80	4.83	88.06	1.60	4.71		8,752	15,734
Same (face of main right heading, about 6,600 feet northwest of mine mouth).	109	26222	A	1	.86	24.91	70.02	4.21	.71					.4	8,312	14,962
				2		25.13	70.62	4.25	.72						8,384	15,091
				3		26.24	73.76		.75						8,736	15,761

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the Bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes a (page).	Sample.			Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Laboratory No. b	Kind. c	Condition. d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.			Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
ALABAMA—Continued.																	
JEFFERSON COUNTY—continued.																	
Majestic; Majestic mine, Black Creek bed (face of 4 room, 1 cross entry left, 4 right north entry, 1,850 feet N. 47° E. of hoisting shaft).	109	32070	A	1	1.89	30.20	62.76	5.15	0.58					1.0	8,011	14,420	
Same (face of main north entry, 5 left entry, 2,100 feet N. 30° E. of hoisting shaft).	109	32071	A	1	2.64	30.47	62.81	4.08	.64					1.7	8,032	14,458	
Same (face of 4 right south air course, 1,400 feet S. 70° W. from hoisting shaft).	109	32072	A	1	2.91	31.17	61.85	4.07	.55					2.0	7,988	14,378	
Same (at room neck, 30 feet outby face of 4 left south entry, 1,500 feet S. 25° W. from hoisting shaft).	109	32073	A	1	1.88	31.25	64.69	2.18	.59					.9	8,247	14,815	
Same (composite of 32070 to 32073).	109	32074	A	1	2.38	30.34	63.48	3.80	.59	5.21	82.16	1.169	6.55	1.4	8,059	14,506	
	110	26900	A	2		31.08	65.03	3.89	.60	5.07	84.16	1.73	4.55		8,256	14,801	
	110	26901	A	3		32.34	67.66		.62	5.28	87.57	1.80	4.73		8,590	15,462	
Palos, 2 miles east of; Bessie mine, Mary Lee bed (face of 25-26 room, 15 right entry, 5,700 feet southwest of mine mouth).	110	26900	A	1	2.06	27.55	59.59	10.80	.77					1.4	7,479	13,462	
Same (face of 27-28 room, 14 right entry, 5,000 feet southwest of mine mouth).	110	26901	A	1	1.90	26.57	59.03	12.50	.84					1.4	7,324	13,183	
Same (face of 11-12 room, 18 left entry, 5,800 feet northeast of mine mouth).	110	26902	A	1	2.45	27.75	59.98	9.82	.74					1.8	7,560	13,608	
Same (composite of samples 26900 to 26902).	110	26903	A	1	2.05	27.48	59.44	11.03	.72	5.04	75.36	1.63	6.22	1.5	7,455	13,419	
			A	2		28.05	60.69	11.26	.74	4.91	76.94	1.66	4.49		7,611	13,700	
			A	3		31.61	68.39		.83	5.53	86.70	1.87	5.07		8,577	15,439	
Same (face of 2 room, 10 left entry).	110	26914	A	1	1.15	30.10	59.40	9.35	.79					.5	7,717	13,891	
Same (face of 28 room, 9 left entry).	110	26915	A	1	2.11	29.43	58.85	9.61	.70					1.4	7,599	13,678	
Same (face of 10 right entry).	110	26916	A	1	1.99	29.73	58.96	9.32	.73					1.4	7,635	13,779	
Same (composite of samples 26914 to 26916).	110	26917	A	1	1.80	29.77	59.04	9.39	.77	5.06	76.78	1.60	6.40	1.1	7,652	13,774	
			A	2		30.31	60.13	9.56	.78	4.95	78.19	1.63	4.89		7,792	14,026	
			A	3		33.51	66.49		.86	5.37	86.45	1.80	5.42		8,616	15,509	

SHELBY COUNTY.

Aldrich, Aldrich mine, Montevallo bed (face of 9 panel).....	111	26730	A	1	2.41	39.99	49.48	8.12	.80	.....	.....	.....	.....	.....	1.0	7,522	13,540
Same (face of 6 panel).....	111	26731	A	1	2.34	39.82	51.75	6.09	.71	.....	.....	.....	.....	.....	1.0	7,659	13,786
Same (face of 1 panel).....	111	26732	A	1	2.17	38.48	52.80	6.55	.78	.....	.....	.....	.....	.....	.8	7,665	13,797
Same (face of 2 panel).....	111	26733	A	1	2.14	38.02	52.30	7.54	.67	.....	.....	.....	.....	.....	.9	7,532	13,558
Same (composite of samples 26730 to 26733).....	111	26734	A	2	2.30	38.60	51.87	7.23	.76	5.20	75.75	1.02	10.04	.....	.9	7,582	13,648
			A	2	.....	39.51	53.09	7.40	.78	5.06	77.53	1.04	8.19	.....	.....	7,760	13,968
			A	3	.....	42.67	57.33	.....	.84	5.46	83.72	1.12	8.86	.....	.....	8,380	15,084
Helena, 2½ miles southwest of; Eureka No. 2 mine, Helena bed (face of 7 right air course, between 19 and 20 rooms), mouth).....	112	25543	A	1	2.91	34.83	51.59	10.67	.38	.....	.....	.....	.....	.....	1.4	7,259	13,066
Same (face of 22 room, 6 left entry, 3,300 feet northeast of mine).....	112	25544	A	1	2.65	34.46	54.18	8.71	.36	.....	.....	.....	.....	.....	1.0	7,439	13,390
Same (face of 30 room, opposite 8 right crossheading).....	112	25545	A	1	2.84	34.66	52.68	9.82	.39	.....	.....	.....	.....	.....	1.3	7,317	13,171
Same (composite of samples 25543 to 25545).....	112	25546	A	2	2.90	34.10	53.35	9.65	.41	5.29	73.92	1.18	9.55	.....	1.2	7,326	13,187
			A	2	.....	35.12	54.94	9.94	.42	5.12	76.13	1.22	7.17	.....	.....	7,545	13,581
			A	3	.....	39.00	61.00	.....	.47	5.69	84.53	1.35	7.96	.....	.....	8,378	15,080
Maylene, 1½ miles south of; Maylene mine, Maylene bed (face of G heading).....	112	26301	A	1	3.46	35.77	51.23	9.54	.45	.....	.....	.....	.....	.....	2.1	7,194	12,949
Same (face of 19 west entry).....	112	26302	A	1	2.78	36.68	53.50	7.04	.44	.....	.....	.....	.....	.....	1.4	7,430	13,374
Same (face of 11 room, 15 east heading).....	112	26303	A	1	2.92	36.96	53.47	6.65	.48	.....	.....	.....	.....	.....	1.4	7,515	13,327
Same (face of 21 room, 12 west heading).....	112	26304	A	1	2.77	37.06	53.70	6.47	.48	.....	.....	.....	.....	.....	1.4	7,573	13,631
Same (composite of samples 26301 to 26304).....	112	26305	A	1	2.99	36.55	53.08	7.38	.44	4.94	74.73	1.18	11.33	.....	1.6	7,435	13,383
			A	2	.....	37.68	54.71	7.61	.45	4.75	77.03	1.22	8.94	.....	.....	7,664	13,795
			A	3	.....	40.78	59.22	.....	.49	5.14	83.38	1.32	9.67	.....	.....	8,296	14,933

ALASKA.

ARCTIC COAST.

Near Wainwright Inlet.....	113	*26371	B	1	20.65	31.77	44.39	3.19	.34	6.01	57.21	1.13	32.12	.....	10.1	5,421	9,758
			B	2	.....	40.04	55.94	4.02	.43	4.69	72.10	1.42	17.34	.....	.....	6,832	12,298
			B	3	.....	41.72	58.28	.....	.45	4.89	75.12	1.48	18.06	.....	.....	7,118	12,812
Tramway between Flat and Iditarod.....	113	26370	B	1	1.52	7.69	85.60	5.19	.79	3.38	85.87	1.56	3.21	.....	.2	7,943	14,297
			B	2	.....	7.81	86.92	5.27	.80	3.26	87.19	1.58	1.90	.....	.....	8,065	14,517
			B	3	.....	8.24	91.76	.....	.84	3.44	92.04	1.67	2.01	.....	.....	8,513	15,323
Chickaloon River, No. 8 bed (sample of washed coal from 120 sacks).....	113	30265	A	1	7.16	20.43	62.80	9.61	.52	4.98	73.38	1.27	10.24	.....	6.2	7,169	12,904
			A	2	.....	22.01	67.64	10.35	.56	4.50	79.04	1.37	4.18	.....	.....	7,722	15,400
			A	3	.....	24.55	75.45	.....	.62	5.02	88.16	1.53	4.67	.....	.....	8,613	15,303
Emery, sec. 16, T. 19 N., R. 3 E.; Kelly mine, Kelly bed (upper bench in 1 chute, 80 feet west of drift mouth).....	113	28731	A	1	4.84	41.64	46.58	6.94	.54	5.92	71.20	1.64	13.76	.....	2.2	7,162	12,892
			A	2	.....	43.76	48.95	7.29	.57	5.65	74.82	1.72	9.95	.....	.....	7,527	13,549
			A	3	.....	47.20	52.80	.....	.61	6.09	80.70	1.86	10.74	.....	.....	8,119	14,614
Same (lower bench in 1 chute, 75 feet west of drift mouth).....	112	28732	A	1	5.13	42.01	44.08	8.78	.40	5.66	88.96	1.63	14.67	.....	2.5	6,880	12,348
			A	2	.....	44.28	46.47	9.25	.42	5.37	72.69	1.61	10.66	.....	.....	7,231	13,016
			A	3	.....	48.79	51.21	.....	.46	5.91	80.10	1.77	11.76	.....	.....	7,622	13,720

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes <i>a</i> (page).	Sample.		Proximate.				Ultimate.						Calorific value.		
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ALASKA—Continued.																
MATANUSKA FIELD—continued.																
Eska, sec. 16, T. 19 N., R. 3 E.; David mine, David bed (2 chute, 75 feet from mine mouth).	114	28733	A	1	4.90	41.55	48.04	5.51	0.52	5.95	71.90	1.63	14.49	2.0	7,241	13,034
				2		43.69	50.52	5.79	.55	5.69	75.60	1.71	10.66		7,614	13,705
				3		46.38	53.62		.58	6.04	80.25	1.82	11.31		8,082	14,548
Same, Maitland mine, Maitland bed (2 chute or plane, represents 2 feet 10 inches of coal).	115	28736	A	1	5.06	42.01	45.70	7.23	.44	5.63	70.34	1.61	14.75	1.9	7,086	12,755
				2		44.25	48.13	7.62	.46	5.34	74.09	1.70	10.79		7,464	13,435
				3		47.90	52.10		.50	5.78	80.20	1.84	11.68		8,080	14,544
Same (grab sample from surface of loaded railroad car).....	115	28737	C	1	6.99	35.41	37.35	20.25	.39					4.0	5,777	10,399
				2		38.07	40.16	21.77	.42						6,211	11,180
				3		48.66	51.34		.54						7,940	14,292
Same, Emery mine, Emery bed (1 chute, 60 feet from mine mouth).	114	28735	A	1	5.43	39.13	45.74	9.70	.33	5.65	68.53	1.54	14.25	2.2	6,873	12,371
				2		41.38	48.36	10.26	.35	5.34	72.46	1.63	9.96		7,268	13,082
				3		46.11	53.89		.39	5.95	80.74	1.82	11.10		8,099	14,578
Same, Eska mine, Eska bed (1 chute).....	115	28734	A	1	4.94	38.03	39.55	17.48	.37	5.41	62.01	1.43	13.30	2.1	6,192	11,146
				2		40.01	41.60	18.39	.39	5.11	65.23	1.50	9.38		6,514	11,725
				3		49.02	50.98		.48	6.26	79.93	1.84	11.49		7,982	14,368
1½ miles northeast of; sec. 10, T. 19 N., R. 3 E.; McCauley prospect, McCauley bed (at face of prospect).	115	28836	A	1	6.81	37.10	46.81	9.28	.53	5.79	66.45	1.21	16.74	3.2	6,607	11,893
				2		39.81	50.23	9.96	.57	5.40	71.31	1.30	11.46		7,090	12,762
				3		44.21	55.79		.63	6.00	79.20	1.44	12.73		7,874	14,173
Moose Creek, Doherty mine, Doherty bed (grab sample of screenings through ½-inch screen from small cleaning plant).	115	28729	A	1	6.02	29.84	29.99	34.15	.37					3.3	4,736	8,525
				2		31.75	31.91	36.34	.39						5,040	9,078
				3		49.87	50.13		.61						7,917	14,251
Same (grab sample from surface of coal pile in bunkers at end of tram road).	115	28730	A	1	4.39	33.24	35.10	27.27	.40					2.0	5,460	9,822
				2		34.77	36.71	28.52	.42						5,711	10,280
				3		48.64	51.36		.59						7,990	14,382
Same, outcrop (3,000 feet up Moose Creek).....	116	28837	A	1	4.71	35.51	50.85	8.93	.34	5.33	67.57	1.91	15.92	.5	6,748	12,146
				2		37.26	53.37	9.37	.36	5.05	70.91	2.00	12.31		7,081	12,746
				3		41.11	58.89		.40	5.57	78.24	2.21	13.58		7,813	14,063
Upper Eska Creek, outcrop (west bank of west fork of middle fork, near north boundary of sec. 9, T. 19 N., R. 3 E.).	116	29362	A	1	5.81	37.92	39.70	16.57	.29	5.38	61.00	1.48	15.28	2.6	6,160	11,088
				2		40.26	42.15	17.59	.31	5.02	64.76	1.57	10.75		6,550	11,772
				3		48.85	51.15		.38	6.09	78.58	1.91	13.04		7,936	14,255

NENANA FIELD

California Creek: outcrop near S.W. $\frac{1}{4}$ sec. 15, T. 9 S., R. 6 W. (face of bluff on east bank of California Creek; partly weathered).	116	*26359	B	1	38.22	23.84	22.15	15.79	.36	6.45	31.14	.49	45.77	32.1	2,924	5,663
				2	.....	38.59	35.85	25.56	.78	3.56	50.40	.79	19.11	.....	4,733	8,519
Same, outcrop near S.W. $\frac{1}{4}$ N.E. $\frac{1}{4}$ sec. 27, T. 10 S., R. 6 W. (face of cliff on east bank of California Creek; partly weathered).	116	*26360	B	1	25.66	43.28	22.80	19.26	.21	5.93	37.86	.53	36.21	18.1	3,569	6,478
				2	.....	43.42	30.67	25.91	.28	4.14	50.93	.71	18.03	.....	4,841	8,714
				3	.....	58.60	41.40	.....	.38	5.39	68.74	.96	24.33	.....	6,554	11,761
Same (duplicate of 26360).....	116	*26361	B	1	26.50	25.12	16.40	31.98	.26	5.35	27.40	.48	34.60	19.8	2,615	4,707
				2	.....	34.18	22.31	43.51	.19	3.28	37.28	.65	15.02	.....	3,558	6,404
				3	.....	60.51	39.49	.....	.46	5.81	65.99	1.15	26.59	.....	6,298	11,335
Healy Creek, 1 mile above mouth of: (outcrop on cliff on north bank of Healy Creek).	117	*26368	B	1	21.50	41.82	30.77	5.91	.25	6.05	49.17	.87	37.95	10.4	4,707	8,581
				2	.....	53.27	39.20	7.53	.32	4.06	62.64	.85	24.00	.....	6,073	10,931
				3	.....	57.61	42.39	.....	.35	5.04	67.74	.92	25.95	.....	6,567	11,821
Lignite Creek: S.W. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 30, T. 11 S., R. 6 W., B bed (outcrop from cliff on north bank of Lignite Creek; slightly weathered).	117	*26362	B	1	20.62	38.80	30.02	10.56	.19	5.87	47.45	.66	35.27	10.4	4,480	8,064
				2	.....	48.88	37.82	13.30	.24	4.51	59.78	.83	21.34	.....	5,644	10,159
N.W. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 26, T. 11 S., R. 6 W. (outcrop on west side of Fault Gulch, Lignite Creek, upper thick bed).	117	*26363	B	1	28.71	35.91	30.26	5.12	.16	6.67	45.81	.59	41.65	19.8	6,510	11,718
				2	.....	50.37	42.45	7.18	.22	4.88	64.26	.89	24.38	.....	6,041	7,700
Same, gulch tributary to Lignite Creek from the north, $\frac{1}{4}$ mile northeast of southwest corner of sec. 26 (face of outcrop).	117	*26364	B	1	22.15	35.29	29.68	12.78	.20	5.91	45.12	.59	35.40	12.2	4,272	7,690
				2	.....	45.46	38.12	16.42	.26	4.43	57.96	.76	20.17	.....	5,457	9,877
Same, $\frac{1}{4}$ mile north of the southeast corner of sec. 26 (face of outcrop).	117	*26365	B	1	23.24	37.59	34.93	4.24	.31	5.30	69.35	.91	24.13	.....	6,565	11,817
				2	.....	48.97	45.51	5.52	.18	6.25	51.53	.57	37.27	10.7	4,955	8,883
NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 27, T. 11 S., R. 6 W., 500 feet up west fork of Lignite Creek on tributary draining sec. 27; natural exposure.	118	*26366	B	1	24.32	37.95	29.35	8.38	.19	6.33	66.84	.61	37.65	15.6	4,456	8,021
				2	.....	50.15	38.78	11.07	.25	4.80	61.89	.81	21.18	.....	6,894	12,247
NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 5, T. 12 S., R. 7 W., north bank of Lignite Creek, about 1 mile above mouth; natural exposure.	118	*26367	B	1	25.30	36.08	32.64	5.98	.28	5.40	69.60	.91	23.81	.....	5,888	10,598
				2	.....	48.30	43.69	8.01	.35	4.79	63.66	.79	22.40	.....	6,051	10,892
NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 35, T. 11 S., R. 7 W., first large gulch from northwest; to large stream entering Lignite Creek from 6 miles from mouth of Lignite Creek, No. 5 bed (weathered outcrop on north side of Lignite Creek).	118	*26369	B	1	23.83	35.55	28.87	11.75	.38	5.21	69.20	.86	24.35	.....	6,578	11,840
				2	.....	55.19	44.81	15.43	.64	4.55	66.24	.87	23.29	.....	5,111	9,200
				3	.....	55.19	44.81	15.43	.64	4.55	66.24	1.03	27.54	.....	6,044	10,879
6 miles from mouth of Lignite Creek, No. 5 bed (weathered outcrop on north side of Lignite Creek).	118	*26588	A	1	32.51	33.62	27.17	6.70	.14	6.31	39.86	.60	46.39	23.5	3,657	9,833
				2	.....	49.81	40.26	9.93	.21	4.00	59.06	.89	25.91	.....	5,463	9,833
6 miles from mouth of Lignite Creek, No. 1 bed (weathered outcrop on north side of Lignite Creek).	118	*26589	A	1	27.92	35.69	29.23	7.03	.23	4.44	60.57	.99	28.77	.....	6,065	10,917
				2	.....	49.62	40.56	9.75	.15	6.51	44.99	.50	40.86	18.7	4,437	7,987
				3	.....	55.06	44.94	.....	.17	5.24	69.15	.76	24.68	.....	6,155	11,079
															6,820	12,276

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the Bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105°C.; 3=moisture and ash free.

Hartford, Central No. 10 mine, Hartshorne bed (face of 4 south entry).....	120	29835	A	1	2.44	18.91	68.83	9.82	80	.....	.....	.....	2.0	7,463	13,433
Same (face of 2 south entry).....	120	29836	A	1	3.35	19.43	66.33	10.89	1.11	.....	.....	.....	2.8	7,299	13,138
Same (face of 3 north entry).....	120	29837	A	1	2.92	19.64	66.97	10.47	1.39	.....	.....	.....	2.4	7,362	13,252
Same (composite of samples 29835 to 29837).....	120	29838	A	2	2.89	19.69	67.34	10.48	1.10	4.10	77.39	1.62	2.4	7,373	13,271
				2	.....	19.86	69.35	10.79	1.13	3.89	79.70	1.67	.....	7,593	13,667
				3	.....	22.26	77.74	.....	1.27	4.36	89.34	1.87	.....	8,512	15,322
Same (tipple samples of run-of-mine coal).....	120	(W69619) W69624 (W69625) W69631 W69615	C	{1 3 3 3 3	1.60	18.11 18.40 21.31 18.09 20.39	66.86 67.95 78.69 70.61 79.61	13.43 13.65 7.50 7.8	83 84 97 1.15 1.20	.....	.....	.....	.....	7,216	12,989
2 1/2 miles northeast of: Central No. 11 mine, Lower Hartshorne bed (face of 1 east entry, west plane).....	121	W69620	A	2	.....	17.42	70.05	9.83	1.70	.....	.....	.....	.....	7,333	13,200
Same (face of 3 east entry, west slope).....	121	W69632	A	2	2.7	17.9	72.0	10.1	1.75	.....	.....	.....	.....	8,493	15,287
Same (face of 4 east entry, east plane).....	121	W69633	A	2	.....	19.91	80.09	9.55	1.95	.....	.....	.....	.....	7,589	13,660
Same (face of 20 room, 2 east entry, east plane).....	121	W69633	A	2	3.5	17.18	69.77	9.9	2.05	.....	.....	.....	.....	7,889	14,200
				3	.....	17.8	72.3	9.9	2.28	.....	.....	.....	.....	8,561	15,410
				3	.....	19.76	80.24	7.27	1.79	.....	.....	.....	.....	7,495	13,490
				3	.....	17.15	72.48	7.5	1.85	.....	.....	.....	.....	7,706	13,870
				3	.....	17.7	74.80	7.5	2.00	.....	.....	.....	.....	8,572	15,430
				3	.....	19.14	80.86	7.87	1.58	.....	.....	.....	.....	7,450	13,410
				3	.....	17.53	65.82	14.97	2.14	.....	.....	.....	.....	7,722	13,900
				3	.....	17.83	66.94	15.23	2.18	.....	.....	.....	.....	8,572	15,430
				3	.....	21.03	78.97	2.57	.....	.....	.....	.....	.....	7,717	13,890
Same (tipple samples, run-of-mine coal).....	121	(W69617) W69621 (W69623) W69635	C	{1 2 3	1.68	17.53 17.83 21.03	65.82 66.94 78.97	14.97 15.23 2.57	2.14 2.18 2.57	.....	.....	.....	.....	7,967	14,340
Huntington, 3 miles west of: Central No. 6 mine, Upper and Lower Hartshorne beds (neck of 8 room, 5 north entry, 2 east entry).....	122	27612	A	1	2.69	19.06	70.38	7.87	1.58	.....	.....	.....	2.3	8,611	15,500
Same (at junction of 6 east and back entry, southeast entry).....	122	27613	A	1	3.65	18.19	67.93	10.23	1.78	.....	.....	.....	.....	7,101	12,782
Same (neck of 21 room, 1 west south entry).....	122	27614	A	1	3.77	17.26	69.54	9.43	1.69	.....	.....	.....	3.1	7,481	13,466
Same (face of 19 room, 2 east entry, main south entry).....	122	27615	A	1	3.32	18.17	69.72	8.79	1.81	.....	.....	.....	3.3	7,535	13,563
Same (face of 1 room, 4 back east entry, main north entry).....	122	27616	A	1	2.88	18.83	69.65	8.64	2.49	.....	.....	.....	2.8	7,644	13,739
Same (composite of samples 27612 to 27616).....	122	27617	A	1	3.21	18.06	69.74	8.99	1.87	4.43	78.72	1.55	2.4	7,698	13,856
				2	.....	18.66	72.05	9.29	1.93	4.21	81.33	1.60	2.8	7,613	13,703
				3	.....	20.57	79.43	2.13	2.13	4.64	89.66	1.76	.....	7,866	14,159
Same (face 5 east entry, main south east entry).....	123	W69329	A	1	4.2	17.53	71.37	6.90	1.10	.....	.....	.....	.....	8,671	15,608
				2	.....	18.3	74.5	7.2	1.15	.....	.....	.....	.....	7,661	13,790
				3	.....	19.72	80.28	.....	1.24	.....	.....	.....	.....	7,995	14,390
Same (duplicate of 69329).....	123	W69330	A	2	3.8	18.86	67.82	9.52	1.44	.....	.....	.....	.....	8,611	15,500
				3	.....	19.6	70.5	9.9	1.50	.....	.....	.....	.....	7,372	13,270
				3	.....	21.75	78.25	11.24	1.66	.....	.....	.....	.....	7,667	13,800
Same (face of 28 room, 1 west entry, main south entry).....	123	W69331	A	2	2.3	17.20	69.26	11.24	2.44					8,511	13,320
				3		17.6	70.9	11.5	2.50					7,383	13,290
				3		19.89	80.11	2.82						7,556	13,600
				3										8,539	15,370

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^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.		Proximate.				Ultimate.					Calorific value.			
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ARKANSAS—Continued.																
SEBASTIAN COUNTY—continued.																
Huntington, 3 miles west of; Central No. 6 mine, Upper and Lower Hartshorne beds (duplicate of W69331).....	123	W69332	A	1 2 3	2.3	17.10 17.5 19.69	69.76 71.4 80.31	10.84 11.1	2.15 2.20	.....	.....	.....	.....	.....	7,428 7,606	13,370 13,690
Same (face of heading, main southeast back entry).....	123	W69334	A	1 2 3	4.8	18.75 19.69 19.7	66.07 69.4 77.89	10.38 10.9	1.95 2.05 2.30	.....	.....	.....	.....	.....	8,556 7,250 7,617	15,400 13,050 13,710
Same (tipple samples of run-of-mine coal).....	123	{W69360 W69363}	{C C}	{1 2 3}	1.68	17.53 17.83 21.28	64.86 65.97 78.72	15.93 16.20	1.95 1.98 2.36	.....	.....	.....	.....	.....	6,996 7,116 8,491	15,380 12,808 15,284
Same (tipple samples of slack coal through 1½ and over ¾ inch screen).	123	{W69357 W69358}	{C C}	{1 2 3}	2.10	16.84 17.20 21.61	61.09 62.40 78.39	19.97 20.40	2.01 2.05 2.58	.....	.....	.....	.....	.....	6,622 6,764 8,497	11,919 12,175 15,295
Same (tipple samples of slack coal through ¾-inch screen).....	123	{W69359 W69359}	{C C}	{1 2 3}	4.8	16.47 17.3 21.60	59.79 62.8 78.40	18.94 19.9	2.08 2.18 2.72	.....	.....	.....	.....	.....	6,458 6,783 8,468	11,624 12,210 15,243
WASHINGTON COUNTY.																
Fayetteville, 5½ miles east of; Stanbery wagon mine, Morrow bed (2 left entry, 600 feet from mine mouth).	124	26260	B	1 2 3	2.58	30.26 31.06 34.76	56.79 58.30 65.24	10.37 10.64	2.96 3.04 3.40	.....	.....	.....	.....	2.0	7,523 7,722 8,642	13,541 13,900 15,556
5½ miles east of; Wagon & Reed wagon mine; Morrow bed (main entry, 400 feet from mine mouth).	124	26259	B	1 2 3	1.84	29.69 30.25 33.92	57.85 58.93 66.08	10.62 10.82	3.71 3.78 4.24	4.95 4.84 5.43	75.45 76.86 86.18	1.31 1.33 1.49	3.96 2.37 2.66	1.2	7,534 7,675 8,606	13,561 13,815 15,491
CALIFORNIA.																
AMADOR COUNTY.																
Lignite, 4 miles northwest of Lone; Lone mine (1,300 feet S. 50° E. of shaft).	124	*31141	B	1 2 3	45.78	30.86 56.92 66.17	15.78 29.10 33.83	7.58 13.98	1.01 1.86 2.16	8.20 5.74 6.67	32.91 60.70 70.56	.32 .59 .69	49.98 17.13 19.92	41.1	3,364 6,204 7,212	6,055 11,167 12,982

124	Same (1,350 feet S. 50° E. of shaft).....	*31108	B	1	40.30	31.26	13.21	15.23	1.26	.....	35.7	3,134	5,641
				2	.....	52.36	22.13	25.51	2.11	.....	.....	5,249	9,448
				3	.....	70.29	29.71	.....	2.83	.....	.....	7,047	12,685
	MENDOCINO COUNTY.												
125	Dos Rios, 4 miles east of: N E. $\frac{1}{2}$ sec. 11, T. 21 N., R. 13 W.; natural outcrop.	31139	B	1	11.44	46.75	35.69	6.12	2.64	.....	4.1	6,210	11,178
				2	.....	52.79	40.30	6.91	2.98	.....	.....	7,012	12,622
				3	.....	56.71	43.29	.....	3.20	.....	.....	7,532	13,558
	MONTEREY COUNTY.												
125	Stone Canon, N.W. $\frac{1}{4}$ sec. 14, T. 22 S., R. 13 E., 24 miles from McKay; Stone Canon mine (face of 1 east entry, below the 300-foot level, 300 feet from inside slope and 4,800 feet east of main slope)	31100	B	1	6.20	49.96	30.38	13.46	4.49	.....	2.0	6,488	11,678
				2	.....	53.26	32.39	14.35	4.79	.....	.....	6,917	12,431
				3	.....	62.18	37.82	.....	5.59	.....	.....	8,076	14,537
125	Same (face of 1 west entry, below the 300-foot level, 200 feet west of inside slope and 4,300 feet east of main slope).	31101	B	1	8.02	48.46	36.01	7.51	4.09	5.90	3.1	6,739	12,130
				2	.....	52.69	39.15	8.16	4.45	5.45	.....	7,327	13,189
				3	.....	57.37	42.63	.....	4.85	5.93	.....	7,978	14,360
	COLORADO.												
	BOULDER COUNTY.												
126	Broomfield, 3 miles northwest of: sec. 28, T. 1 S., R. 69 W.; Monarch No. 2 mine (face of 7 southwest entry).	*31314	A	1	19.32	32.53	42.50	5.65	24	.....	11.8	5,545	9,981
126	Same (face of main south entry).....	*31315	A	1	18.98	33.60	42.50	4.92	29	.....	10.6	5,615	10,107
126	Same (composite of samples 31314 and 31315).....	*31316	A	2	19.14	33.44	42.07	5.35	27	5.97	29.52	5,365	10,017
				3	.....	41.34	52.04	6.62	33	4.75	15.47	6,882	12,388
				3	.....	44.27	55.73	.....	35	5.09	16.56	7,370	13,268
126	Lafayette; sec. 2, T. 1 S., R. 69 W.; Simpson mine, Lower Simpson bed (face of 13 southwest entry, main south entry).	*39391	A	1	20.85	34.47	41.13	3.55	30	6.11	31.24	5,488	9,878
				2	.....	43.55	51.96	4.49	38	4.79	16.05	6,934	12,481
				3	.....	45.60	54.40	.....	40	5.02	16.80	7,260	13,068
127	Louisville; sec. 8, T. 1 S., R. 69 W.; Acme mine, Lower Acme bed (face of 3 room, 6 northeast entry).	*31384	A	1	20.47	32.83	42.36	4.34	32	5.95	31.26	5,420	9,786
				2	.....	41.28	53.26	5.46	40	4.63	16.42	6,815	12,267
				3	.....	43.67	56.33	.....	42	4.90	17.37	7,209	12,976
	DELTA COUNTY.												
127	Bowie, $\frac{1}{2}$ mile northeast of: sec. 10, T. 13 N., R. 91 W.; King mine, King bed (last crosscut between the 6th left entries).	28920	A	1	4.16	39.86	50.98	5.00	55	.....	7	7,320	13,176
				2	.....	41.59	53.19	5.22	57	.....	.....	7,638	13,748
				3	.....	43.88	56.12	.....	60	.....	.....	8,059	14,506
	EL PASO COUNTY.												
128	Colorado Springs, 3 $\frac{1}{2}$ miles northeast of: sec. 33, T. 13 S., R. 66 W.; El Paso mine, A bed (10 feet outby face of 5 east entry, on left rib).	*28907	A	1	22.99	34.09	36.55	6.37	31	.....	6.0	4,856	8,741
128	Same (face of 18 room, 6 west entry).....	*28908	A	1	24.86	34.08	35.17	5.89	33	.....	11.5	4,723	8,501
128	Same (face of 20 room, 5 east entry).....	*28909	A	1	23.41	33.02	37.54	6.03	34	.....	6.1	4,810	8,668
128	Same (composite of samples 28907 to 28909).....	*28910	A	1	23.71	33.68	36.49	6.12	35	6.15	35.47	4,914	8,647
				2	.....	44.15	47.83	8.02	46	4.61	18.87	6,297	11,885
				3	.....	48.00	52.00	.....	50	5.01	20.52	6,846	12,823

Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6.)

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105°C; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.		Proximate.				Ultimate.					Calorific value.			
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
COLORADO—Continued.																
EL PASO COUNTY—continued.																
Pike View Station, 1 mile north of; sec. 18, T. 13 S., R. 66 W.; Pike View mine, A bed (right rib of 8 room, main dip entry, 10 feet outby face, 1 mile northwest of shaft).	129	*28911	A	i	25.82	34.18	35.64	4.36	0.30	.....	.....	.....	.....	12.8	4,635	8,343
Same (right rib, 10 entry, opposite 31 room, 1 mile northwest of shaft).	129	*28912	A	1	26.58	33.23	35.53	4.66	.30	.....	.....	.....	.....	13.2	4,593	8,267
Same (right rib of 6 room, outby 106 face, 45 entry, 1 mile northwest of shaft).	129	*28913	A	1	25.59	33.22	33.42	7.77	.32	.....	.....	.....	.....	12.7	4,443	7,997
Same (face of 25 room, 106 entry, 1 mile northwest of shaft).....	129	*28914	A	1	25.89	33.76	35.47	4.88	.32	.....	.....	.....	.....	12.3	4,605	8,289
Same (right rib of 1 room, 106 entry, 45 entry, 15 feet outby face, 1 mile northwest of shaft).	129	*28915	A	1	26.27	33.11	36.02	4.60	.27	.....	.....	.....	.....	12.5	4,588	8,258
Same (composite of samples 28911 to 28915).....	129	*28916	A	1	26.00	33.49	35.36	5.15	.30	6.27	49.02	.57	38.69	12.7	4,573	8,231
GUNNISON COUNTY.																
Somerset; sec. 9, T. 13 S., R. 90 W.; Somerset mine (left rib of 15 room, 10 east entry).	130	31817	A	1	4.33	39.69	46.68	9.30	.41	5.49	70.62	1.51	12.67	1.6	7,015	12,627
Same (left rib of 17 room, 10 east entry, between 2 and 3 cross-cuts).	130	31798	A	2	.....	41.49	48.79	9.72	.43	5.24	73.82	1.58	9.21	.....	7,333	13,199
				3	.....	45.96	54.04	.....	.48	5.80	81.77	1.75	10.20	.....	8,123	14,621
Same (left rib of 17 room, 10 east entry, between 2 and 3 cross-cuts; bony coal).	130	31799	A	1	2.51	35.30	39.75	22.44	8.76	4.56	56.32	1.13	6.79	.8	5,912	10,642
				2	.....	36.21	40.77	23.02	8.99	4.39	57.77	1.16	4.67	.....	6,064	10,915
Same (left rib of 17 room, 10 east entry, between 2 and 3 cross-cuts; bony coal).	130	31799	A	3	.....	47.04	52.96	.....	11.68	5.70	75.04	1.51	6.07	.....	7,877	14,179
				2	3.26	35.56	31.80	29.38	1.64	4.60	53.41	1.10	9.87	1.3	5,423	9,761
Same (at mouth of 13 room, 10 east entry, top coal).....	130	31800	A	2	.....	36.76	32.87	30.37	1.70	4.38	55.21	1.14	7.20	.....	5,606	10,091
				3	.....	52.79	47.21	.....	2.44	6.29	79.29	1.64	10.34	.....	8,051	14,492
Same (face of 1 dip entry, 5 south entry).....	131	31407	A	1	4.60	40.42	51.60	3.38	.43	5.72	75.09	1.56	13.82	1.9	7,474	13,453
				2	.....	42.37	54.09	3.54	.45	5.46	78.71	1.64	10.20	.....	7,834	14,101
HUERFANO COUNTY.																
Ravenwood; Ravenwood mine, Cameron bed (face of 11 north main entry).	131	31406	A	1	5.14	37.32	49.65	7.89	.80	.....	.....	.....	.....	2.8	6,980	12,564
Same (face of 1 dip entry, 5 south entry).....	131	31407	A	1	4.43	38.29	49.21	8.07	.67	.....	.....	.....	.....	2.0	7,033	12,639
				1	4.80	38.18	48.95	8.07	.74	5.35	70.97	1.42	13.45	2.4	6,999	12,593

LAS ANIMAS COUNTY.															
Cokedale, 7 miles northwest of: secs. 31 and 32, T. 32 and 33 E., R. 65 W.; Bon Garbo mine, Primero bed (face of 1 south air course).	131	31451	A	2	.....	40.10	51.42	8.48	5.06	74.55	1.49	9.64	7.352	13.239	
				3	.....	43.82	56.18	.....	5.53	81.46	1.63	10.53	8.034	14.461	
				1	2.58	34.17	49.45	13.80	5.08	71.00	1.53	8.10	7.028	12.650	
Delagua; sec. 15, T. 31 S., R. 65 W.; Cass mine, Delagua bed (face of 3 east entry).	132	31432	A	2	.....	40.87	59.13	14.17	4.92	72.88	1.57	9.96	7.214	12.985	
				3	.....	45.07	63.15	15.58	5.73	84.91	1.83	6.95	8.405	15.129	
				1	3.98	38.74	48.97	8.31	7.2	.....	.....	.....	7.293	13.127	
Delagua mine, Delagua bed (face of 7 room, 11 west entry).....	133	29351	A	2	.....	40.35	51.00	8.65	7.5	.....	.....	.....	7.506	13.673	
				3	.....	44.17	55.83	13.22	.....	.....	.....	.....	8.315	14.967	
				1	3.28	36.92	46.58	13.22	6.3	.....	.....	.....	6.821	12.278	
Delagua 1st north district, Delagua bed (face of 10 room, 8 east entry, 14 east entry).	133	31423	A	2	.....	38.17	48.16	13.67	6.5	.....	.....	.....	7.052	12.694	
				3	.....	44.21	55.79	13.67	7.5	.....	.....	.....	8.168	14.702	
				1	4.17	36.11	52.49	7.23	6.8	.....	.....	.....	7.275	13.085	
Same (face of 9 room, 7 east entry, 6 north entry).....	133	31424	A	2	.....	36.06	51.69	7.75	.....	.....	.....	.....	7.190	12.942	
				3	.....	36.25	52.03	6.58	.....	.....	.....	.....	7.356	13.241	
				1	4.24	36.51	52.03	7.17	5.38	73.93	1.39	11.55	7.270	13.085	
Same (face of 18 east parting).....	133	31425	A	2	.....	38.15	54.36	7.49	5.12	77.24	1.45	8.09	7.506	13.673	
				3	.....	41.24	58.76	8.35	5.53	83.50	1.57	8.74	8.211	14.780	
				1	3.21	38.52	49.92	8.35	.....	.....	.....	.....	7.306	13.151	
Delagua 3d north district, Delagua bed (face of 17 west entry, 5 north entry).	134	31427	A	2	.....	39.80	51.57	8.63	5.53	.....	.....	.....	7.519	13.588	
				3	.....	43.56	56.44	15.34	.....	.....	.....	.....	8.262	14.872	
				1	2.48	33.44	48.74	15.34	7.0	.....	.....	.....	6.906	12.431	
Hastings, sec. 25, T. 32 S., R. 64 W.; Hastings mine, A bed (face of last room, 7½ north entry, 1 mile from mine mouth).	134	29278	A	2	.....	34.29	49.98	15.73	7.2	.....	.....	.....	7.081	12.746	
				3	.....	40.69	59.31	11.14	.....	.....	.....	.....	8.403	15.125	
				1	2.42	34.21	52.23	11.14	6.1	.....	.....	.....	7.256	13.061	
Same, B bed (right rib in crosscut, main entry, opposite 3 north entry, about 1 mile from mine mouth).	134	29277	A	2	.....	35.06	53.52	11.42	6.3	.....	.....	.....	7.361	13.385	
				3	.....	39.58	60.42	10.16	7.1	.....	.....	.....	8.365	15.111	
				1	2.67	37.17	50.00	10.16	6.6	.....	.....	.....	7.081	12.746	
Same (face of crosscut, 60 feet north of air shaft, between A and B beds).	134	29465	A	2	.....	38.19	51.37	10.44	6.8	.....	.....	.....	7.563	13.613	
				3	.....	42.64	57.36	11.42	7.6	.....	.....	.....	8.445	15.201	
				1	1.91	32.37	53.64	12.08	8.0	.....	.....	.....	7.254	13.067	
Morley, Morley mine, Morley bed (face of main slope).....	135	32046	A	2	.....	33.53	50.83	13.61	6.1	.....	.....	.....	7.146	12.863	
				3	.....	32.59	52.55	12.78	7.0	.....	.....	.....	7.197	12.955	
				1	2.08	32.59	52.55	13.05	7.1	71.73	1.23	8.60	7.380	13.239	
Same (face of 7 left entry, main slope).....	135	32047	A	2	.....	33.28	53.67	13.05	7.1	73.25	1.26	6.90	8.453	15.215	
				3	.....	38.28	61.72	17.73	8.2	84.24	1.45	7.94	8.453	15.215	
				1	2.10	28.30	51.87	18.11	7.5	69.33	1.25	6.21	6.884	12.355	
Sopris, NW ¼ SE ¼ sec. 33, T. 33 S., R. 64 W.; Sopris No. 2 mine, Came- ron bed (face of 3 east entry).	136	31949	A	2	.....	28.91	52.98	18.11	7.5	70.82	1.28	4.42	7.012	12.622	
				3	.....	35.30	64.70	14.54	9.2	86.49	1.56	5.39	8.563	15.413	
				1	1.50	30.83	53.03	14.64	6.0	71.95	1.16	6.71	7.008	12.971	
Starkville, ½ mile from, Starkville mine, Starkville bed (face of 8 south entry, J-6 entry).	137	32030	A	2	.....	31.30	53.84	14.86	6.1	73.04	1.18	5.50	7.208	12.971	
				3	.....	36.76	63.24	14.86	7.2	85.79	1.39	6.45	8.463	15.233	
				1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	

a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.
 b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).
 c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.
 d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105°C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
COLORADO—Continued.																
MESA COUNTY.																
Cameo, NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 34, T. 10 S., R. 98 W.; Cameo mine, Cameo bed (face of 7 north entry, 6 west entry).	138	28917	A	1	7.34	36.15	46.97	9.54	0.58	.....	.....	.....	.....	1.9	6,543	11,777
Same (face of 22 room, 8 west entry).	138	28918	A	1	7.20	36.89	47.70	8.21	.58	.....	.....	.....	.....	1.9	6,676	12,017
Same (composite of samples 28917 and 28918).	138	28919	A	2	7.15	36.76	47.20	8.89	.57	5.42	67.64	1.40	16.08	1.9	6,606	11,891
				3	.....	39.59	50.84	9.57	.61	4.99	72.85	1.51	10.47	.....	7,115	12,807
				3	.....	43.78	56.22	.....	.67	5.52	80.56	1.67	11.58	.....	7,868	14,162
OURAY COUNTY.																
Ridgway, 12 miles northeast of; NW. $\frac{1}{4}$ sec. 23, T. 46 N., R. 7 W.; Lou Creek mine (in main entry, 300 feet from mine mouth).	138	31044	B	1	15.46	35.99	40.15	8.40	.81	5.71	57.99	1.08	26.01	6.5	5,576	10,037
				2	.....	42.57	47.49	9.94	.96	4.72	68.60	1.28	14.50	.....	6,596	11,873
				3	.....	47.27	52.73	.....	1.07	5.24	76.17	1.42	16.10	.....	7,324	13,183
PITKIN COUNTY.																
Placita, sec. 6, T. 11 S., R. 88 W.; Placita mine (1,200 feet southwest of mine mouth).	139	25826	B	1	2.23	33.84	57.33	6.60	.49	5.29	78.28	1.71	7.63	1.4	7,842	14,116
				2	.....	34.61	58.64	6.75	.50	5.15	80.06	1.75	5.79	.....	8,021	14,438
				3	.....	37.12	62.88	.....	.54	5.52	85.86	1.88	6.20	.....	8,602	15,484
ROUFT COUNTY.																
Milner, 7 miles south of; NW. $\frac{1}{4}$ sec. 13, T. 5 N., R. 86 W.; Chergo mine, Wadgo bed (face of main slope, 300 feet from mine mouth).	139	31038	B	1	12.82	37.15	44.44	5.59	.43	5.77	63.26	1.49	23.46	4.0	6,130	11,034
				2	.....	42.61	50.98	6.41	.49	4.99	72.57	1.71	13.83	.....	7,032	12,658
				3	.....	45.53	54.47	.....	.52	5.33	77.54	1.83	14.78	.....	7,514	13,525
Mount Harris, secs. 5 and 8, T. 6 N., Mount Harris mine, Wadgo bed (left rib, 20 feet from face of 10 south entry).	139	31199	A	1	10.41	38.15	46.51	4.93	.42	.....	.....	.....	.....	5.5	6,475	11,655
Same (face of 3 east entry, main south slope).	139	31200	A	1	12.40	37.62	44.21	5.77	.42	.....	.....	.....	.....	7.1	6,212	11,182
Same (left rib, main south entry, 20 feet from face of G slope).	139	31201	A	1	10.64	37.54	46.18	5.64	.40	.....	.....	.....	.....	5.8	6,415	11,547
Same (face of 7 east back entry, 2 south entry).	139	31202	A	1	11.44	37.15	45.44	5.97	.40	.....	.....	.....	.....	6.4	6,275	11,295
Same (face of 10 east entry, main south entry).	139	31203	A	1	10.84	37.15	45.34	6.67	.40	.....	.....	.....	.....	5.4	6,253	11,255
Same (left rib in last crosscut in A slope, 40 feet from face of entry).	139	31204	A	1	9.90	37.99	46.31	5.80	.40	.....	.....	.....	.....	5.0	6,444	11,599
Same (left rib, main south entry, 30 feet from face).	139	31205	A	1	11.30	38.31	46.42	3.97	.39	.....	.....	.....	.....	6.0	6,464	11,635
Same (rib of main dip entry, 5 feet from face).	139	31206	A	1	10.76	37.81	45.33	6.10	.42	.....	.....	.....	.....	5.8	6,357	11,443

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (a page).	Sample.			Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.			Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
ILLINOIS.																	
CHRISTIAN COUNTY.																	
Pana, 1 mile northeast of; Springside mine, No. 6 bed (face of 20 main entry, main north entry, 5,400 feet from shaft).	143	25748	A	1	13.62	37.60	39.62	9.16	3.78					4.6	6,122	11,020	
Same (face of 13 room, 17 west entry, main north entry, 5,400 feet from shaft).	143	25749	A	1	13.72	37.42	39.05	9.81	4.11					5.2	6,026	10,847	
Same (face of 10 room, 5 south entry, 5 east entry, main north entry, 2,700 feet from shaft.)	143	25750	A	1	12.52	34.74	39.06	13.68	3.40					4.7	5,770	10,386	
Same (face of 7 east entry, main north entry, 4,500 feet from shaft)	143	25751	A	1	12.31	38.59	39.15	9.95	3.54					3.9	6,159	11,086	
Same (composite of samples 25748 to 25751)	143	25752	A	2	13.04	36.98	39.25	10.73	3.66	5.58	59.83	1.14	19.06	4.6	6,031	10,856	
			A	3		42.53	45.13	12.34	4.21	4.75	68.80	1.31	8.59		6,936	12,485	
			A	2		48.52	51.48		4.80	5.42	78.49	1.49	9.80		7,913	14,243	
			A	1	11.89	37.14	40.58	10.39	3.88					9.3	6,142	11,056	
Same (face of 9 room, 14 north entry, main east south entry, 4,800 feet southeast from shaft).	143	26336	A	1	11.98	38.52	39.18	10.32	4.21					5.4	6,178	11,120	
Same (face of main east south entry, 5,400 feet southeast from shaft).	143	26337	A	1	11.93	38.21	39.50	10.36	4.00	5.73	61.37	1.02	17.52	7.3	6,159	11,086	
Same (composite of samples 26336 and 26337)	143	26338	A	2		43.39	44.85	11.76	4.54	5.00	69.69	1.16	7.85		6,994	12,589	
			A	3		49.17	50.83		5.15	5.67	78.98	1.31	8.89		7,926	14,267	
FRANKLIN COUNTY.																	
Buckner, $\frac{1}{2}$ mile east of; United No. 14 mine, No. 6 bed (face of 8 panel, 6 north entry, main east entry, in by 9 room neck).	144	26129	A	1	10.61	33.39	48.37	7.63	1.02	5.74	67.41	1.53	16.67	6.9	6,586	11,855	
			A	2		37.35	54.11	8.54	1.14	5.10	75.41	1.71	8.10		7,368	13,262	
			B	3		40.84	59.16		1.25	5.58	82.45	1.87	8.85		8,056	14,501	
Bush, $1\frac{1}{2}$ miles northwest of; sec. 31, T. 7 S., R. 1 E.; Bush No. 2 mine, No. 6 bed (face of main northeast entry).	145	30877	B	1	8.72	34.31	46.15	10.82	3.81					4.7	6,413	11,543	
Same (end of northwest entry)	145	30878	B	1	10.04	33.77	47.53	8.66	2.43					5.6	6,514	11,725	
Same (face of 5 south entry, 2 west entry, south entry)	145	30879	B	1	9.67	33.32	46.67	10.34	3.07					4.7	6,415	11,547	
Same (end of main south entry)	145	30880	B	1	9.27	34.27	45.48	10.98	3.79					4.6	6,367	11,461	

Same (composite of samples 30877 to 30880).....	145	30881	B	1	9.41	34.06	46.30	10.23	3.29	5.30	64.41	1.27	15.50	4.9	6,417	11,551
Christopher, 1 mile north of: Old Ben No. 10 mine, No. 6 bed (last crosscut, 12 northeast entry, at mouth of 1 east entry).....	146	29741	A	1	9.73	34.19	48.99	7.09	1.08	5.29	80.15	1.58	8.89	6.8	7,084	12,751
Same (12 room neck, 5 west entry, 6 southwest entry).....	146	29742	A	1	10.34	33.70	46.90	9.06	.54	.....	.....	.....	.....	.....	6,665	11,997
Same (face of 19 room, 100 feet from 10 northwest entry).....	146	29743	A	1	9.28	34.17	48.97	7.78	.74	.....	.....	.....	.....	7.4	6,403	11,529
Same (last crosscut, 3 northeast entry, at mouth of 4 west entry).....	146	29744	A	1	9.17	34.29	49.15	7.39	1.17	.....	.....	.....	.....	6.5	6,605	11,885
Same (face of 14 southwest entry, at 22 room).....	146	29745	A	1	10.56	34.81	44.73	9.90	.45	.....	.....	.....	.....	5.5	6,757	12,163
Same (last crosscut, 11 west entry, 3 southeast entry, at 8 room).....	146	29746	A	1	10.36	32.12	47.21	10.31	.56	.....	.....	.....	.....	7.8	6,308	11,354
Same (composite of samples 29741 to 29746).....	146	29747	A	1	9.77	34.15	47.45	8.63	.75	5.34	66.23	1.51	17.54	6.9	6,514	11,725
Same (at 18 room, 10 northwest entry, 60 feet from entry; top coal).....	146	29754	A	2	.....	37.85	52.59	9.56	.83	4.71	73.40	1.67	9.83	.....	7,219	12,994
1 1/2 miles north of: sec. 14, T. 6 S., R. 1 E.; Old Ben No. 11 mine, No. 6 bed (face of 2 north entry, 12 west entry, 1 northwest entry).....	146	30892	B	1	10.04	35.48	47.29	7.19	.77	.....	.....	.....	.....	.....	7,982	14,368
Same (face of main west entry).....	146	30893	B	1	11.33	32.38	47.18	9.11	.59	.....	.....	.....	.....	.....	7,653	13,829
Same (face of 1 northeast entry).....	146	30894	B	1	9.04	36.20	47.86	6.90	1.28	.....	.....	.....	.....	.....	6,983	12,515
Same (face of 1 southeast entry, 4 east panel, 29 room).....	146	30895	B	1	10.43	33.10	48.50	7.97	.52	.....	.....	.....	.....	.....	8,026	14,447
Same (composite of samples 30892 to 30895).....	146	30896	B	1	10.18	34.31	47.79	7.72	.77	5.53	66.64	1.54	17.80	3.9	6,571	11,828
Herrin, 4 miles north and 1 mile east of: sec. 33, T. 7 S., R. 2 E.; No. 5 (Franklin Emery) mine, No. 6 bed (face of 14 room, 7 northwest entry).....	147	30867	B	1	10.74	32.20	50.91	6.15	.83	4.90	74.19	1.71	9.75	.....	7,315	13,167
Same (crosscut between 1 and 2 northeast entries).....	147	30868	B	1	10.36	32.52	47.17	9.95	.63	5.36	81.16	1.87	10.67	4.9	8,003	14,405
Same (face of 3 room, 7 southeast entry).....	147	30869	B	1	9.86	32.38	49.68	8.08	.93	.....	.....	.....	.....	.....	6,067	12,001
Same (stub of 7 west entry, 4 south entry, west entry).....	147	30870	B	1	10.91	32.32	50.89	5.88	.56	.....	.....	.....	.....	.....	6,309	11,356
Same (composite of samples 30867 to 30870).....	147	30871	B	1	10.54	32.42	49.33	7.71	.72	5.40	66.92	1.48	17.77	4.8	6,625	11,925
Orient, Orient mine, No. 6 bed (car sample from 15 loaded cars).....	148	30266	C	1	7.86	34.10	49.62	8.42	1.18	4.73	74.80	1.65	9.40	.....	6,684	12,049
Same (car sample from 17 loaded cars).....	148	30267	C	1	7.83	34.70	47.96	9.51	1.20	5.32	81.46	1.84	9.97	.....	6,566	11,819
Same (car sample from 32 loaded cars).....	148	30844	C	1	8.02	35.66	48.46	7.86	1.07	4.84	72.97	1.66	8.91	.....	7,339	13,210
Same (car sample from 159 loaded cars).....	148	31050	C	1	7.35	36.70	47.88	8.07	1.10	5.33	67.25	1.53	15.18	2.8	8,031	14,456
				2	.....	37.65	52.03	10.32	1.30	4.84	72.97	1.66	8.91	.....	6,745	12,141
				3	.....	41.98	58.02	14.45	1.45	5.32	81.46	1.84	9.97	.....	7,320	13,176
				2	.....	35.66	48.46	7.86	1.07	5.38	68.57	1.55	15.57	1.7	8,056	14,501
				3	.....	38.77	52.68	8.55	1.16	4.88	74.55	1.69	9.17	.....	6,646	11,968
				2	.....	42.39	57.60	12.26	1.26	5.34	81.52	1.85	10.02	.....	7,211	12,980
				3	.....	39.61	47.88	8.07	1.10	5.35	69.00	1.57	14.99	3.1	8,041	14,474
				2	.....	36.70	47.88	8.07	1.10	4.89	74.47	1.69	9.14	.....	6,738	12,128
				3	.....	43.39	56.61	8.71	1.20	5.36	81.57	1.85	10.02	.....	8,011	13,187
				2	.....	39.61	47.88	8.07	1.10	4.89	74.47	1.69	9.14	.....	7,326	13,187
				3	.....	43.39	56.61	8.71	1.20	5.36	81.57	1.85	10.02	.....	8,011	13,187

a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.
 b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the Bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).
 c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.
 d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes a (page).	Sample.		Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ILLINOIS—Continued.																
FRANKLIN COUNTY—continued.																
Royalton, North or No. 1 mine, No. 6 bed (car sample from 13 loaded cars)	148	30205	C	1	7.64	31.37	50.03	10.96	1.06	5.06	66.21	1.45	15.26	4.4	6,493	11,687
Same (car sample from 22 loaded cars)	148	30207	C	2	.....	33.96	54.17	11.87	1.15	4.56	71.69	1.57	9.16	.....	7,030	12,654
				3	.....	38.53	61.47	.....	1.30	5.17	81.35	1.78	10.40		7,977	14,359
				2	8.86	31.23	49.28	10.63	1.10	5.23	65.97	1.48	15.59		6,446	11,603
Same (car sample from 22 loaded cars)	148	30207	C	2	.....	34.27	54.07	11.66	1.21	4.66	72.38	1.62	8.47	.....	7,073	12,731
				3	.....	38.79	61.21	.....	1.37	5.28	81.93	1.83	9.59		8,007	14,413
				1	9.54	32.91	48.41	9.14	.98	.....	.....	.....	7.2		6,540	11,772
Sesser, 1½ miles southeast of; Sesser No. 1 mine, No. 6 bed (face of main east entry).	148	26492	A	1	9.58	33.25	50.16	7.01	1.08	.....	.....	.....	.....	6.6	6,695	12,051
Same (face of 1 new south entry, main east entry).....	148	26493	A	1	10.97	33.70	46.86	8.47	.99	.....	.....	.....	.....	7.9	6,484	11,671
Same (face of 2 room, 3,200 feet E. 10° S.).....	148	26494	A	1	10.26	33.17	48.39	8.18	1.31	.....	.....	.....	.....	6.2	6,588	11,858
Same (face of main north entry).....	148	26495	A	1	9.68	32.90	48.35	9.07	1.09	.....	.....	.....	.....	6.9	6,496	11,693
Same (face of 8 east entry, main north entry).....	148	26496	A	1	10.06	33.40	48.19	8.35	1.11	5.47	66.77	1.27	17.03	7.0	6,565	11,817
Same (composite of samples 26492 to 26496).....	148	26497	A	2	.....	37.14	53.58	9.28	1.23	4.84	74.24	1.41	9.00	.....	7,300	13,140
Same (car sample from 9 loaded cars).....	148	30206	C	3	.....	40.94	59.06	.....	1.36	5.34	81.83	1.55	9.92	.....	8,047	14,485
				2	8.49	34.11	48.71	8.69	1.11	5.29	67.86	1.46	15.59		6,702	12,064
				3	.....	37.28	53.22	9.50	1.21	4.75	74.16	1.60	8.78		7,324	13,183
Same (car sample from 5 loaded cars).....	148	30208	C	1	8.05	34.51	47.67	9.77	1.06	5.40	67.21	1.49	15.07	4.8	6,626	11,927
Same (car sample from 5 loaded cars).....	148	30208	C	2	.....	37.53	51.85	10.62	1.15	4.90	73.09	1.62	8.62	.....	7,206	12,971
				3	.....	41.99	58.01	.....	1.29	5.48	81.78	1.81	9.64		8,063	14,513
				2	9.66	34.06	47.27	9.01	1.17	5.47	66.65	1.43	16.27		6,592	11,866
Same (car sample from 10 loaded cars).....	148	30485	C	1	.....	37.70	52.33	9.97	1.30	4.87	73.77	1.58	8.51	.....	7,297	13,135
Same (car sample from 10 loaded cars).....	148	30485	C	2	.....	41.87	58.13	.....	1.44	5.41	81.94	1.75	9.46	.....	8,105	14,589
				3	.....	41.87	58.13	.....	1.44	5.41	81.94	1.75	9.46		8,105	14,589
				1	10.04	33.61	48.01	8.34	1.10	5.47	67.19	1.51	16.39		6,610	11,898
Same (car sample from 8 loaded cars).....	148	30486	C	1	.....	37.36	53.37	9.27	1.22	4.84	74.69	1.68	8.30	.....	7,348	13,226
Same (car sample from 8 loaded cars).....	148	30486	C	2	.....	41.18	58.82	.....	1.34	5.33	82.32	1.85	9.16	.....	8,099	14,578
				3	.....	41.18	58.82	.....	1.34	5.33	82.32	1.85	9.16		8,099	14,578
				1	.....	41.18	58.82	.....	1.34	5.33	82.32	1.85	9.16		8,099	14,578

West Frankfort, 1 mile south of: sec. 25, T. 7 S., R. 2 E., Old Ben No. 8 mine, No. 6 bed (face of 4 east north entry). Same (face of 6 west entry, main south entry). Same (face of main south entry). Same (composite of samples 30887 to 30889).	149	30887	B	1	11.15	33.95	47.50	7.40	1.36						6.9	6.519	11.734
	149	30888	B	1	9.08	34.99	48.21	7.72	1.43						5.5	6.677	12.019
	149	30889	B	1	10.31	33.54	49.91	6.24	1.11						6.3	6.697	12.055
	149	30890	B	1	10.38	33.42	49.00	7.20	1.26	5.43	67.76	1.52	16.83	8.47	6.3	6.616	11.949
		2				37.29	54.68	8.03	1.41	4.78	75.61	1.70	8.47		7.328	13.288	
		3				40.55	59.45		1.53	5.20	82.21	1.85	9.21		8.026	14.447	
	150	30882	B	1	9.94	33.39	48.99	7.68	1.14						6.0	6.600	11.880
	150	30883	B	1	10.04	33.08	49.42	7.46	1.24						6.1	6.610	11.898
	150	30884	B	1	10.73	33.02	47.65	8.60	1.61						7.0	6.465	11.637
	150	30885	B	1	10.05	33.93	48.58	7.44	1.40						5.5	6.692	11.884
Same (face of back north entry). Same (face of main north entry). Same (composite of samples 30882 to 30885).	150	30886	B	1	10.23	33.76	48.26	7.75	1.33	5.36	66.85	1.45	17.26	6.1	6.597	11.875	
		2				37.61	53.76	8.63	1.48	4.70	74.47	1.62	9.10		7.349	13.228	
		3				41.16	58.84		1.62	5.14	81.51	1.77	9.96		8.043	14.477	
	PERRY COUNTY.																
Duquoin, 3 miles east of: Paradise mine, No. 6 bed (face of 26 room, 2 south entry, main east entry). Same (face of 12 south entry, 2 plug east entry). Same (face of main east entry). Same (face of main north entry). Same (face of 7 west entry, main north entry). Same (face of 9 south entry, 5 west entry, main north entry). Same (composite of samples 26462 to 26467).	150	26462	A	1	10.45	33.92	47.88	7.75	.83						6.0	6.516	11.729
	150	26463	A	1	10.66	33.04	47.60	8.70	.82						4.9	6.439	11.590
	150	26464	A	1	10.61	33.04	46.72	9.63	1.02						5.6	6.340	11.412
	150	26465	A	1	11.26	33.84	46.18	8.72	.80						2.4	6.380	11.484
	150	26466	A	1	11.75	33.49	45.94	8.82	.78						6.7	6.329	11.392
	150	26467	A	1	11.47	32.81	47.22	8.50	1.08						5.6	6.380	11.484
	150	26468	A	1	10.76	33.10	47.37	8.77	.84	5.38	64.49	1.36	19.16	5.2	6.402	11.524	
		2				37.09	53.08	9.83	.94	4.68	72.27	1.52	10.76		7.174	12.913	
		3				41.13	58.87		1.04	5.19	80.15	1.69	11.93		7.956	14.321	
	151	26469	A	2	13.73	33.99	49.58	2.70	.77						7.8	6.762	12.064
Same (face of 6 room, 10 south entry, main east entry, top coal). 3 miles south of: sec. 29, T. 6 S., R. 1 W.; Security No. 1 mine, No. 6 bed (face of 2 room, 17 north entry, 4 west north entry). Same (face of 3 south entry, 8 west south entry). Same (face of 8 room, south of 6 east south entry). Same (face of 18 room, south entry, 4 west south entry). Same (composite of samples 31033 to 31036).						39.40	57.47	3.13	.89						7.769	13.984	
		3				40.67	59.33		.92						8.029	14.436	
	151	31033	B	1	12.34	33.48	45.02	9.16	1.82						7.2	6.206	11.171
	151	31034	B	1	12.19	34.16	44.50	9.15	1.32						6.9	6.247	11.245
	151	31035	B	1	11.93	33.50	45.35	9.22	1.36						7.2	6.254	11.257
	151	31036	B	1	11.86	34.13	44.63	9.38	1.46						7.0	6.242	11.236
	151	31037	B	1	12.04	33.89	44.85	9.22	1.52	5.51	63.13	1.32	19.30	7.1	6.237	11.227	
		2				38.53	50.99	10.48	1.73	4.74	71.77	1.50	9.78		7.091	12.764	
		3				43.04	56.96		1.93	5.30	80.17	1.68	10.92		7.921	14.258	
	SALINE COUNTY.																
Grayson, 2½ miles east of Eldorado: No. 6 mine, No. 5 bed (face of 7 room, 8 east entry, 3 southwest entry). Same (face of 5 west entry, 4 southwest entry). Same (composite of samples 28448 and 28449).	152	28448	A	1	4.73	37.88	47.70	9.69	4.13						2.7	6.924	12.463
	152	28449	A	1	4.94	39.50	45.79	9.77	3.94						2.8	6.900	12.420
	152	28450	A	1	4.71	38.50	46.90	9.89	4.08	5.53	68.87	1.45	10.15	2.5	6.928	12.470	
		2				40.40	49.22	10.38	4.28	5.26	72.27	1.52	6.30		7.270	13.088	
	3				45.08	54.92		4.78	5.87	80.64	1.71	7.01		8.112	14.602		

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^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ILLINOIS—Continued.																
WILLIAMSON COUNTY.																
Herrin, 4 miles northeast of; sec. 5, T. 8 S., R. 2 E.; Pond Creek (Bobby Dix) mine, No. 6 bed (face at end of main south entry).	152	30872	B	1	9.13	32.21	47.97	10.69	0.80	.....	.....	.....	.....	3.0	3,689	11,500
Same (face at end of main north entry).....	152	30873	B	1	8.84	32.52	49.81	8.83	1.09	.....	.....	.....	.....	2.6	6,596	11,873
Same (face of 6 east entry, main south entry).....	152	30874	B	1	9.75	33.36	51.37	5.52	.88	.....	.....	.....	.....	3.6	6,822	12,280
Same (face of 5 south west entry).....	152	30875	B	1	10.82	31.11	49.02	9.05	.88	.....	.....	.....	.....	4.5	6,470	11,646
Same (composite of samples 30872 to 30875).....	152	30876	B	2	9.44	32.99	48.95	8.62	.93	5.17	67.06	1.51	16.71	3.4	6,588	11,858
						36.43	54.05	9.52	1.03	4.55	74.05	1.67	9.18	.....	7,274	13,093
						40.26	59.74	.....	1.14	5.03	81.84	1.85	10.14	.....	8,039	14,470
						32.84	50.65	6.79	.96	.....	.....	.....	.....	3.5	6,681	12,026
3½ miles northwest of; sec. 1, T. 8 S., R. 1 E.; No. 2 (Weaver) mine, No. 6 bed (face of back south entry, main south entry).	153	30863	B	1	9.72	32.84	50.65	.....	.....	.....	.....	.....	.....	.....	.....	.....
Same (face of 3 west entry, main north entry).....	153	30864	B	1	9.40	34.38	47.35	8.87	1.28	.....	.....	.....	.....	3.9	6,556	11,801
Same (face of 7 west south entry).....	153	30865	B	1	10.58	32.47	46.30	10.65	1.57	.....	.....	.....	.....	5.7	6,200	11,322
Same (composite of samples 30863 to 30865).....	153	30866	B	2	9.94	32.92	48.30	8.84	1.28	5.34	66.18	1.46	16.90	4.4	6,508	11,714
						36.55	53.63	9.82	1.42	4.71	73.49	1.62	8.94	.....	7,226	13,007
						40.53	59.47	.....	1.57	5.22	81.49	1.80	9.92	.....	8,013	14,423
4½ miles northwest of; Rend No. 2 mine, No. 6 bed (face of 7 room, 1 south stub entry, 8 west entry, main south entry).	154	28811	A	1	9.13	31.48	51.00	8.39	.97	.....	.....	.....	.....	3.6	6,568	11,822
Same (face of 10 east entry, main south entry).....	154	28810	A	1	8.31	32.40	50.75	8.54	1.37	.....	.....	.....	.....	3.2	6,647	11,965
Same (face of 12 room, 3 west entry, main north entry).....	154	28812	A	1	8.82	35.15	47.90	8.13	1.07	.....	.....	.....	.....	3.2	6,647	11,965
Same (face of 2 room, 2 north panel, 2 east entry, main north entry).	154	28813	A	1	9.31	32.93	49.63	8.13	.82	.....	.....	.....	.....	3.8	6,612	11,902
Same (face of 26 room, 1 east entry, main south entry).....	154	28814	A	1	9.78	33.08	49.93	7.21	.75	.....	.....	.....	.....	3.6	6,647	11,965
Same (composite of samples 28810 to 28814).....	154	28815	A	2	9.33	32.76	49.94	7.97	.97	5.48	67.05	1.43	17.10	3.8	6,618	11,912
						36.13	55.08	8.79	1.07	4.90	73.95	1.58	9.71	.....	7,289	13,138
						39.61	60.39	.....	1.17	5.37	81.08	1.73	10.65	.....	8,003	14,405
INDIANA.																
GREENE COUNTY.																
Jasonville, 3 miles southwest of; Gilmour No. 7 mine, No. 4 bed (10 feet from face of 15 east entry, south).	154	31295	A	1	13.38	36.69	43.10	6.83	1.39	.....	.....	.....	.....	10.3	6,481	11,666
Same (face of 6 room, 6 south entry, 15 east entry, south).....	154	31296	A	1	13.09	36.93	43.23	6.75	1.13	.....	.....	.....	.....	10.0	6,482	11,668
Same (face of 17 east entry, south entry, opposite 4 south entry).....	154	31297	A	1	14.66	35.39	43.57	6.38	1.05	.....	.....	.....	.....	11.6	6,388	11,498

Same (face of 5 room, 2 south entry, 18 west entry, south).....	155	31298	A	1	12.78	35.91	42.09	9.22	1.02	5.82	64.51	1.45	19.84	9.7	6.332	11.398
Same (composite of samples 31295 to 31298).....	155	31299	A	2	13.51	36.26	42.93	7.30	1.08	4.99	74.59	1.68	9.05	10.4	7.415	11.543
				3	.....	45.79	54.21	8.44	1.25	4.49	81.47	1.83	9.88	.....	8.069	14.578
Linton, 2 miles northwest of: Vandalia No. 24 mine, No. 4 bed (face of 4 room, 5 east entry, 5 north entry).....	155	31278	A	1	13.72	36.84	42.94	6.50	.97	.....	.....	.....	.....	10.1	6.515	11.727
Same (face of 4 north entry, 600 feet from main west entry).....	155	31279	A	1	13.61	36.98	41.47	7.94	1.40	.....	.....	.....	.....	10.6	6.403	11.525
Same (face of 9 northwest entry, opposite 15 room).....	155	31280	A	1	11.88	38.84	42.08	7.20	1.32	.....	.....	.....	.....	8.7	6.582	11.848
Same (composite of samples 31278 to 31280).....	155	31281	A	2	12.99	37.21	42.63	7.17	1.52	5.89	64.91	1.47	19.24	9.8	6.480	11.664
				3	.....	42.77	48.99	8.24	1.66	5.11	74.60	1.69	8.84	.....	7.447	13.405
				3	.....	46.61	53.39	.....	1.66	5.57	81.30	1.84	9.63	.....	8.116	14.609
KNOX COUNTY.																
South Bruceville, 1½ miles south of Bruceville, in Washington Township; T. 4 N., R. 9 W.; No. 1 mine, No. 5 bed (face of 4 room, 4 southeast entry).....	156	27632	A	1	9.70	38.57	42.02	9.71	3.04	.....	.....	.....	.....	7.5	6.477	11.659
Same (face of 14 room, 1 north entry, main east entry).....	156	27633	A	1	9.73	37.13	40.84	12.30	3.19	.....	.....	.....	.....	7.5	6.266	11.279
Same (face of 2 west entry, straight south entry).....	156	27634	A	1	8.97	38.46	41.70	10.87	3.45	.....	.....	.....	.....	6.7	6.449	11.608
Same (composite of samples 27632 to 27634).....	156	27635	A	2	9.47	38.27	41.36	10.90	3.21	5.53	62.28	.98	17.10	7.2	6.412	11.542
				3	.....	42.27	45.69	12.04	3.55	4.95	68.79	1.08	9.59	.....	7.083	12.749
Same (3 breakthrough from face of 2 west entry, straight south entry, lower half of bed).....	156	27636	A	1	10.18	48.06	51.94	10.67	3.37	.....	.....	.....	.....	8.0	8.053	14.495
				2	.....	38.36	40.79	11.88	3.75	.....	.....	.....	.....	.....	6.365	11.457
				3	.....	48.47	51.53	.....	4.26	.....	.....	.....	.....	.....	7.086	12.755
Same (face of 10 room, 1 southeast entry).....	156	27660	A	2	10.14	37.11	43.71	9.04	3.00	5.65	64.88	1.18	16.25	7.1	8.041	14.474
				3	.....	41.30	48.64	10.06	3.34	5.03	72.20	1.31	8.06	.....	6.512	11.722
				3	.....	45.92	54.08	.....	3.71	5.50	80.28	1.46	8.96	.....	7.247	13.045
Same (face of 8 room, 2 east entry, back north entry).....	156	27661	A	1	10.47	37.22	40.53	11.78	3.12	5.39	62.69	1.22	16.40	7.6	8.058	14.504
				2	.....	41.57	45.27	13.16	3.48	4.72	69.35	1.36	7.93	.....	6.271	11.288
				3	.....	47.87	52.13	.....	4.01	5.44	79.86	1.57	9.12	.....	7.004	12.607
PIKE COUNTY.																
Winslow, Ayrshire No. 7 mine, No. 5 bed (car sample from 10 loaded cars).....	157	30228	C	1	12.31	35.05	46.54	6.10	.97	5.92	66.53	1.51	18.97	9.6	6.609	11.896
				2	.....	39.97	53.07	6.96	1.11	5.19	75.87	1.72	9.15	.....	7.537	13.567
				3	.....	42.96	57.04	.....	1.19	5.58	81.55	1.85	9.83	.....	8.101	14.582
Same (car sample from 10 loaded cars).....	157	30229	C	1	13.23	34.59	46.72	5.46	.89	5.96	66.35	1.48	19.86	10.6	6.567	11.821
				2	.....	39.86	53.85	6.29	1.03	5.17	76.47	1.71	9.33	.....	7.568	13.622
				3	.....	42.53	57.47	.....	1.10	5.52	81.60	1.82	9.96	.....	8.076	14.537
Same (car sample from 10 loaded cars).....	157	30230	C	1	12.98	35.74	45.56	5.72	.88	5.96	66.43	1.54	19.47	9.9	6.578	11.840
				2	.....	41.07	52.36	6.57	1.01	5.19	76.34	1.77	9.12	.....	7.539	13.606
				3	.....	43.96	56.04	.....	1.08	5.55	81.71	1.89	9.77	.....	8.030	14.562
Same (car sample from 5 loaded cars).....	157	30231	C	1	13.02	35.53	46.41	5.04	.96	6.02	65.87	1.54	19.57	16.3	6.631	11.936
				2	.....	40.85	53.36	5.79	1.10	5.25	76.88	1.77	9.21	.....	7.624	13.728
				3	.....	43.36	56.64	.....	1.17	5.57	81.61	1.88	9.77	.....	8.063	14.567
Same (car sample from loading boom while car was being loaded).....	157	30843	C	1	12.73	36.04	45.72	5.51	.93	5.85	65.80	1.50	19.41	3.6	6.589	11.860
				2	.....	41.30	52.39	6.31	1.07	5.09	76.55	1.72	9.26	.....	7.550	13.590
				3	.....	44.08	55.92	.....	1.14	5.43	81.71	1.84	9.88	.....	8.039	14.506

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the Bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.			Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.			Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	12	14	15	16	17	
INDIANA—Continued.																	
SULLIVAN COUNTY.																	
Dugger, 1½ miles southwest of; Vandalia No. 10 mine, No. 4 bed (face of main north entry, opposite 15 east entry).	157	31262	A	1	14.32	34.01	44.94	6.73	1.32					11.4	6,467	11,641	
Same (face of 3 west entry, 2 south entry, 500 feet from 1 south entry).	157	31263	A	1	12.37	36.35	44.94	6.34	1.81					8.8	6,613	11,903	
Same (face of 20 room, 14 north entry, 14 east north).	157	31264	A	1	11.39	37.37	43.35	7.89	1.50					8.4	6,611	11,900	
Same (opposite 14 room, 2 south entry, 3 east entry, 3 south entry).	157	31265	A	1	12.30	35.87	44.91	6.92	1.43					9.3	6,582	11,848	
Same (face of main north entry, opposite 15 east entry; "mother coal."	157	31266	A	1	25.98	13.84	57.83	2.35	.25	5.32	64.66	0.58	26.84	24.9	5,931	10,676	
				2		18.70	78.13	3.17	.34	3.28	87.36	.78	5.07		8,013	14,423	
				3		19.31	80.69		.35	3.39	90.22	.81	5.23		8,273	14,895	
Same (composite of samples 31262 to 31265)	157	31267	A	1	12.61	36.02	44.49	6.88	1.51	5.87	65.65	1.48	18.61	9.5	6,552	11,794	
				2		41.22	50.91	7.87	1.73	5.12	75.12	1.69	8.47		7,497	13,495	
				3		44.74	55.26		1.88	5.56	81.54	1.83	9.19		8,137	14,647	
2½ miles southwest of; Vandalia No. 22 mine, No. 4 bed (face of main south entry).	158	31274	A	1	10.70	37.89	42.23	9.18	2.69					8.2	6,523	11,741	
Same (face of main air course).	158	31275	A	1	11.03	38.51	43.69	6.77	1.90					7.4	6,708	12,074	
Same (face of 1 west entry, main north entry).	158	31276	A	1	10.92	38.26	42.95	7.87	3.24					8.4	6,625	11,925	
Same (composite of samples 31274 to 31276)	158	31277	A	2				7.96	2.63	5.76	65.36	1.44	16.85	8.0	6,601	11,882	
				2		43.09	47.98	8.93	2.95	5.11	73.31	1.62	8.08		7,404	13,327	
				3		47.32	52.68		3.24	5.61	80.50	1.78	8.87		8,130	14,634	
3 miles north of; Ayrdale No. 27 mine, No. 4 bed (50 feet from 2 east entry, 5 northeast entry).	159	31290	A	1	12.78	36.51	43.97	6.74	1.23					9.8	6,515	11,727	
Same (50 feet from 3 south entry, 3 southeast entry).	159	31291	A	1	12.35	36.39	43.54	7.72	1.46					9.3	6,492	11,686	
Same (face of 23 room, 5 north entry, east entry).	159	31292	A	1	12.49	37.13	42.89	7.49	1.12					9.6	6,509	11,716	
Same (face of 5 room, 1 west entry, 1 north entry, 3 east entry, north entry).	159	31293	A	1	12.88	35.12	45.28	6.72	1.15					9.9	6,533	11,759	
Same (composite of samples 31290 to 31292)	159	31294	A	1	12.67	35.86	44.31	7.16	1.21	5.86	65.33	1.46	18.98	9.6	6,516	11,729	
				2		41.06	50.74	8.20	1.39	5.10	74.81	1.67	8.83		7,461	13,430	
				3		44.73	55.27		1.51	5.56	81.49	1.82	9.62		8,127	14,629	

Sullivan, 5 miles east of: Vandalia No. 17 mine, No. 6 bed (face of 1 room, 3 north entry, east entry).....	160	31268	A	1	12.49	36.32	43.33	7.86	2.34	.....	.....	8.8	6.425	11.565
Same (face of 9 room, 2 south entry, west entry).....	160	31269	A	1	12.71	36.90	42.12	8.27	2.26	.....	.....	9.4	6.363	11.453
Same (face of 13 room, 4 southeast entry).....	160	31270	A	1	14.30	36.19	41.93	7.58	2.57	.....	.....	10.6	6.315	11.372
Same (face of 3 north entry, east entry, opposite 13 room).....	160	31271	A	1	11.76	37.03	42.49	8.72	2.02	.....	.....	8.0	6.413	11.543
Same (face of 2 west entry, 2 north entry, west entry).....	160	31272	A	1	10.89	36.15	41.92	11.04	2.42	.....	.....	7.5	6.291	11.324
Same (composite of samples 31268 to 31272).....	160	31273	A	2	12.38	36.63	42.28	8.71	2.26	5.70	63.41	18.64	6.342	11.416
				3	.....	46.43	53.57	9.94	2.58	4.93	72.37	8.72	7.238	13.028
7 miles east of: Vandalia No. 28 mine, No. 4 bed (100 feet south of air shaft).....	160	31282	A	1	14.94	35.52	43.70	5.84	.....	5.47	80.36	1.62	8.037	14.467
Same (100 feet north of air shaft).....	160	31283	A	1	14.11	35.12	43.54	7.23	1.44	.....	.....	.....	6.436	11.585
Same (face of 1 east entry, south entry, 60 feet from shaft).....	160	31284	A	1	15.58	34.24	43.30	6.88	1.24	.....	.....	11.0	6.345	11.421
Same (composite of samples 31282 to 31284).....	160	31285	A	1	14.93	34.32	43.10	6.65	1.27	5.93	63.79	1.43	6.256	11.261
				2	.....	40.34	51.84	7.82	1.49	5.02	74.99	1.68	6.342	11.416
				3	.....	43.76	56.24	.....	1.62	5.45	81.35	1.82	7.455	13.419
VERMILION COUNTY.													8.087	14.557
Clinton, 2½ miles southwest of: Clinton No. 4 mine, No 4 bed (face of 8 south entry).....	161	31257	A	1	14.32	34.68	44.14	6.86	1.10	.....	.....	10.4	6.359	11.446
Same (face of 1 room, 15 south entry, 16 west entry).....	161	31258	A	1	15.58	35.06	42.27	7.09	.....	.....	.....	11.3	6.207	11.173
Same (face of 3 east entry, 8 south entry).....	161	31259	A	1	15.30	33.40	43.50	7.80	1.05	.....	.....	12.0	6.160	11.088
Same (face of 7 room, 1 north entry, main west entry).....	161	31260	A	1	13.57	35.38	43.81	7.24	1.33	.....	.....	9.8	6.382	11.488
Same (composite of samples 31257 to 31260).....	161	31261	A	1	14.68	34.21	43.86	7.25	1.10	5.89	63.48	1.38	6.293	11.327
				2	.....	40.10	51.40	8.50	1.29	4.99	74.40	1.62	7.376	13.277
				3	.....	43.83	56.17	.....	1.41	5.45	81.31	1.77	8.061	14.510
VIGO COUNTY.														
Coal Bluff, 1 mile northwest of: Vigo No. 74 mine, Minshall bed (face of 12 east, south entry, near mouth of 14 room; bony coal).....	162	26118	A	1	11.77	37.17	39.24	11.82	2.28	.....	.....	8.8	.....	.....
				2	.....	42.13	44.47	13.40	2.58	.....	.....	.....	.....	.....
				3	.....	48.65	51.35	.....	2.98	.....	.....	.....	.....	.....
Same (face of 6 room, 100 feet in by 14 west south entry).....	162	26119	A	1	12.57	37.98	41.13	8.32	2.85	.....	.....	9.5	6.428	11.570
Same (face of main south entry, 50 feet in by 16 east entry).....	162	26120	A	1	12.54	36.05	41.54	9.87	3.82	.....	.....	9.3	6.232	11.218
Same (face of 34 room, 7 west entry, 200 feet from entry).....	162	26121	A	1	13.60	37.47	40.46	8.47	2.45	.....	.....	10.4	6.301	11.342
Same (at 2 breakthrough, 6 room, 3 north entry, 7 west entry).....	162	26122	A	1	12.73	37.72	42.56	6.99	1.60	.....	.....	7.7	6.499	11.698
Same (face of 12 east south entry, near mouth of 14 room).....	162	26123	A	1	13.86	36.68	41.72	7.74	2.45	6.01	63.37	1.29	6.370	11.466
Same (composite of samples 26119 to 26123).....	162	26124	A	1	13.10	36.83	41.73	8.34	2.60	5.24	72.92	1.48	6.380	11.484
				2	.....	42.38	48.02	9.60	2.99	5.24	72.92	1.48	7.341	13.214
				3	.....	46.88	53.12	.....	3.31	5.80	80.66	1.61	8.121	14.618
Terre Haute, 5 miles west of: Vandalia No. 82 mine, No. 3 bed (face of 4 south entry).....	163	31286	A	1	9.78	39.79	41.09	9.34	4.00	.....	.....	6.7	6.329	11.752
Same (face of main east entry).....	163	31287	A	1	9.78	38.38	39.81	12.03	5.38	.....	.....	6.9	6.309	11.356
Same (face of 2 west entry).....	163	31288	A	1	9.38	38.91	40.34	11.37	5.36	.....	.....	6.2	6.303	11.507
Same (composite of samples 31286 to 31288).....	163	31289	A	1	9.73	38.52	40.91	10.84	5.00	5.54	62.14	1.25	6.306	11.513
				2		42.67	45.32	12.01	5.54	4.94	68.84	1.38	7.085	12.753
				3		48.49	51.51		6.30	5.61	78.24	1.57	8.052	14.494

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^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (Page).	Sample.			Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.			(Calories.)	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
KANSAS.																	
CHEROKEE COUNTY.																	
Stone City, $\frac{1}{2}$ mile northeast of; Mayer No. 9 mine, Cherokee bed (face of 1 east entry, north entry).	164	27222	A	1	5.16	34.78	51.62	8.44	3.27					3.6	7,237	13,027	
				2	.....	36.67	54.43	8.90	3.45						7,631	13,736	
				3	.....	40.25	59.75		3.79						8,377	15,079	
Same (in last crosscut between straight and back north entries).	164	27223	A	1	6.22	33.38	52.04	8.36	3.01					4.5	7,161	12,890	
				2	.....	35.59	55.50	8.91	3.21						7,636	13,745	
				3	.....	39.07	60.93		3.52						8,383	15,089	
Same (in last crosscut between straight and back north entries).	164	27224	A	1	6.19	33.32	52.63	7.86	2.82					4.5	7,216	12,989	
				2	.....	35.52	56.10	8.38	3.01						7,692	13,846	
				3	.....	38.77	61.23		3.29						8,396	15,113	
Same (face of 1 east entry, north entry).....	164	27225	A	1	5.09	34.47	52.17	8.27	3.34	5.23	71.81	1.20	10.15	3.6	7,268	13,082	
				2	.....	36.32	54.97	8.71	3.52	4.91	75.66	1.26	5.91		7,658	13,784	
				3	.....	39.78	60.22		3.86	5.38	82.88	1.38	6.50		8,389	15,100	
CRAWFORD COUNTY.																	
Edison, $\frac{1}{2}$ mile north of, S.W. $\frac{1}{4}$ sec. 13, T. 29 S., R. 24 E.; Wear No. 21 mine, Cherokee bed (face of 1 room, 1 sub north entry, 5 west entry, main east entry).	164	30293	A	1	3.31	34.34	50.12	12.23	4.87					1.8	6,973	12,551	
Same (face of 1 room, 1 sub north entry, 5 west entry, 1 north entry, main east entry).	164	30294	A	1	4.17	34.16	50.16	11.51	4.68					2.7	6,949	12,436	
Same (composite of samples 30293 and 30294).....	164	30295	A	1	3.89	34.25	50.06	11.80	4.65	4.86	68.84	1.15	8.70	2.3	6,942	12,496	
				2	.....	35.64	52.08	12.28	4.84	4.61	71.63	1.20	5.44		7,223	13,001	
				3	.....	40.63	59.37		5.51	5.26	81.06	1.37	6.20		8,234	14,821	
KENTUCKY.																	
CHRISTIAN COUNTY.																	
Mannington; Williams mine, Empire bed (face of 1 room, 2 north entry, 80 feet from entry).	165	W70506	A	1	9.14	34.92	46.86	9.09	2.92						6,644	11,959	
				2	.....	38.43	51.57	10.00	3.21						7,312	13,162	
				3	.....	42.70	57.30		3.57						8,125	14,624	
Same (face of 4 room, 2 west entry, 110 feet from entry).....	165	W70507	A	1	9.00	33.61	47.67	9.72	3.68						6,581	11,845	

165	W70508	A	2 3	36.93 41.35	52.39 53.65	10.68 6.48	4.04 4.52				7.231 8.096	13.016 14.572
			1	9.69	49.48	6.48	2.34				6.886	12.305
165	W70509	C	2 3	38.04 40.98	54.79 59.02	7.17 7.19	2.59 2.79				7.570 8.154	13.625 14.677
			1	9.23	46.38	10.72	3.14				6.490	11.682
165	W70510	C	2 3	37.09 42.06	51.10 57.94	11.81 9.65	3.46 3.92				7.150 8.108	12.570 14.594
			1	9.09	45.70	9.65	3.09				6.558	11.804
165	W70511	C	2 3	39.12 43.77	50.26 56.23	10.62 9.32	3.40 3.80				7.213 8.070	12.984 14.526
			1	8.88	45.87	9.32	3.06				6.619	11.914
			2	39.43	50.34	10.23	3.36				7.264	13.075
			3	43.93	56.07		3.74				8.091	14.564
LETCHE COUNTY.												
166	29845	A	1	2.91	57.23	2.91	.67				1.2	7.904
166	29846	A	1	3.10	57.22	3.22	.64				1.5	7.851
166	29847	A	1	3.00	57.25	3.13	.65				1.3	7.889
			2	37.75	59.02	3.23	.67				8.133	14.639
			3	39.01	60.99		.69				8.405	15.129
WEBSTER COUNTY.												
167	30747	A	1	6.78	46.39	13.40	1.21				2.8	6.508
167	30748	A	1	4.61	51.67	7.17	1.08				1.3	7.231
167	30749	A	1	4.49	49.97	10.22	1.04				1.3	6.967
167	30750	A	1	5.99	52.35	6.60	1.08				1.9	7.167
167	30751	A	1	5.35	50.39	9.34	1.05				1.8	6.945
			2	36.89	53.24	9.87	1.11				7.337	13.207
			3	40.93	59.07		1.23				8.140	14.652
MARYLAND.												
ALLEGANY COUNTY.												
168	26506	B	1	2.74	71.37	5.99	.98				1.8	7.910
			2		73.38	6.16	1.01				8.133	14.632
			3		78.20		1.08				8.067	15.001
168	26985	B	1	3.06	71.06	10.29	2.50				2.4	7.440
			2		73.30	10.62	2.58				7.075	13.815
			3		82.01		2.89				8.587	15.457

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^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.			Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Labo- ratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed car- bon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.			Calories.	British ther- mal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
MARYLAND—Continued.																	
ALLEGANY COUNTY—continued.																	
Barrellville, $\frac{1}{2}$ mile southwest of; Enriek No. 1 mine, Bluebaugh bed (face of main heading).	168	26504	B	1	2.34	15.20	69.42	13.04	0.82	4.16	73.47	1.28	7.23	1.6	7,320	13,176	
				2	.....	15.56	71.09	13.35	.84	3.99	73.23	1.31	5.28	.....	7,496	13,493	
				3	.....	17.96	82.04		.97	4.60	86.82	1.51	6.10	.....	8,651	15,572	
$\frac{1}{2}$ mile northeast of; Parker mine, Parker bed (face of 2 room, on right, at top of dip heading).	169	26539	B	1	3.75	16.66	74.68	4.91	1.13	4.55	81.87	1.40	6.14	2.8	7,920	14,256	
				2	.....	17.31	77.59	5.10	1.17	4.29	85.06	1.45	2.93	.....	8,229	14,812	
				3	.....	18.24	81.76		1.23	4.52	89.63	1.53	3.09	.....	8,671	15,608	
1 mile southwest of; Pratt's mine, Brush Creek bed (face of main heading, 80 feet in entry).	169	26542	B	1	3.77	15.92	71.06	9.25	1.21	4.59	78.04	1.58	5.33	3.1	7,548	13,586	
				2	.....	16.54	73.85	9.61	1.26	4.33	81.10	1.64	2.06	.....	7,844	14,119	
				3	.....	18.30	81.70		1.39	4.79	89.72	1.81	2.29	.....	8,678	15,620	
Barton, $\frac{3}{4}$ mile north of; Moscow No. 3 mine, Bakerstown bed (face of 4 room, 2 left heading).	169	26533	B	1	2.30	17.43	70.33	9.94	2.22	4.37	77.87	1.70	3.94	1.6	7,578	13,640	
				2	.....	17.84	71.99	10.17	2.27	4.17	79.70	1.74	1.95	.....	7,756	13,961	
				3	.....	19.86	80.14		2.53	4.64	88.72	1.94	2.17	.....	8,634	15,541	
Swanton mine, Bakerstown bed (at right rib, face of 6 heading)...	170	26978	B	1	2.90	16.27	69.94	10.89	1.93	4.29	76.56	1.54	4.79	2.3	7,415	13,347	
				2	.....	16.76	72.02	11.22	1.99	4.09	78.85	1.59	2.26	.....	7,637	13,747	
				3	.....	18.88	81.12		2.24	4.61	88.82	1.79	2.54	.....	8,602	15,484	
Same (face of 2 right butt, main entry).....	170	26986	B	1	2.34	20.34	69.56	7.76	1.15	4.60	78.20	1.58	6.71	1.8	7,800	14,004	
				2	.....	20.83	71.22	7.95	1.18	4.44	80.08	1.62	4.73	.....	7,967	14,341	
				3	.....	22.63	77.37		1.28	4.82	87.00	1.76	3.14	.....	8,655	15,579	
Borden Shaft; Consolidation No. 12 mine, Pittsburg bed ("Klondike heading," off left empty, slant entry).	170	26528	B	1	2.17	18.89	71.60	7.34	1.02	4.66	81.01	1.95	4.02	1.3	7,875	14,175	
				2	.....	19.31	73.19	7.50	1.04	4.52	82.81	1.99	2.14	.....	8,050	14,490	
Eckhart; Washington No. 2 mine, Tyson bed (face of 6 room, 4 left heading).	171	26507	B	1	2.22	20.88	73.12	7.50	1.12	4.89	89.53	2.15	2.31	.....	8,703	15,665	
				2	.....	19.90	74.32	5.65	.89	4.71	82.23	1.73	2.88	.....	8,013	14,423	
				3	.....	21.12	78.88	5.78	.91	4.56	84.10	1.77	3.05	.....	8,195	14,751	
Ellerslie, 2 miles west of; Ellerslie clay mine, Mercer bed (face of 1 right butt, 1 right heading).	171	26987	B	1	2.91	20.86	58.63	17.60	.97	4.84	89.26	1.88	6.77	2.4	6,766	12,179	
				2	.....	21.49	69.38	18.13	3.78	4.31	66.48	1.06	6.77	.....	8,697	15,655	
				3	.....	26.25	73.75		3.89	4.11	68.47	1.09	4.31	.....	6,969	12,544	
Same; Quakertown bed (at right rib, 2 right heading, 20 feet from main heading).	171	26988	B	1	3.05	21.13	59.31	15.51	4.75	5.02	83.63	1.33	5.27	.....	8,512	15,322	
				2	.....	21.80	61.17	17.03	2.83	4.45	66.94	1.13	8.14	2.6	6,788	12,218	
				3	.....	26.28	73.72		3.52	4.24	69.05	1.17	5.59	.....	7,002	12,604	
				3	.....	26.28	73.72		3.52	5.11	83.23	1.41	6.73	.....	8,440	15,192	

Same (face of main heading).....	178	W71056	A	1	3.00	17.38	61.92	17.70	1.34	.....	.....	.....	.....	.....	.....	6.793	12.228
				2	.....	17.92	63.83	18.25	1.38	.....	.....	.....	.....	.....	.....	7.063	12.606
				3	.....	21.92	78.08	.....	1.69	.....	.....	.....	.....	.....	.....	8.507	15.420
Same (ear samples of loaded run-of-mine coal).....	178	W71130 W71133	C	1	3.38	17.71	64.66	14.25	1.27	.....	.....	.....	.....	.....	.....	7.652	12.604
				2	.....	18.33	66.92	14.75	1.31	.....	.....	.....	.....	.....	.....	7.299	13.138
				3	.....	21.50	78.50	.....	1.54	.....	.....	.....	.....	.....	.....	8.561	15.411
Same (ear samples of loaded run-of-mine coal).....	178	W71134 W71137	C	1	3.20	17.84	64.22	14.74	1.46	.....	.....	.....	.....	.....	.....	7.036	12.664
				2	.....	18.43	66.34	15.23	1.51	.....	.....	.....	.....	.....	.....	7.268	13.083
				3	.....	21.74	78.26	.....	1.78	.....	.....	.....	.....	.....	.....	8.575	15.434
2 ¹ miles northwest of No. 6 (fire clay) mine, Mount Savage (Mercer) bed (at butt opening, main heading, 600 feet from entry).	179	26580	B	1	2.76	18.80	62.74	15.70	1.28	.....	.....	.....	.....	.....	.....	7.014	12.625
				2	.....	19.33	64.52	16.15	1.32	.....	.....	.....	.....	.....	.....	7.213	12.983
				3	.....	23.05	76.95	.....	1.57	.....	.....	.....	.....	.....	.....	8.602	15.484
3 mile east of Henry Mullaney's mine, Lower Freeport bed (face of main heading, 120 feet from mouth).	180	26543	B	1	3.15	15.55	61.44	19.86	3.98	.....	.....	.....	.....	.....	.....	6.493	11.687
				2	.....	16.06	63.43	20.51	4.11	.....	.....	.....	.....	.....	.....	6.704	12.067
				3	.....	20.20	79.80	.....	5.17	.....	.....	.....	.....	.....	.....	8.434	15.181
Ocean Station; Consolidation No. 1 mine, Pittsburgh bed (face of Spitz- man's heading).	180	26527	B	1	2.92	18.69	69.63	8.76	.99	.....	.....	.....	.....	.....	.....	7.683	13.829
				2	.....	19.25	71.73	9.02	1.02	.....	.....	.....	.....	.....	.....	7.914	14.245
				3	.....	21.16	78.84	.....	1.12	.....	.....	.....	.....	.....	.....	8.698	15.656
Same (face of rock heading, 2 right entry).....	181	W68178	A	1	2.50	18.40	70.40	8.70	.78	.....	.....	.....	.....	.....	.....	7.747	13.945
Same (face of 5 room, Old Lye heading, inside 20 heading).....	181	W68181	A	1	1.90	18.10	72.00	8.00	.78	.....	.....	.....	.....	.....	.....	7.840	14.112
Same (face of 7 room, 9 right entry, straight slope entry).....	181	W68217	A	1	1.80	17.60	72.40	8.20	1.18	.....	.....	.....	.....	.....	.....	7.845	14.121
Same (face of 4 room, 9 heading, Hawkins heading).....	181	W68218	A	1	1.70	18.90	73.20	8.20	.59	.....	.....	.....	.....	.....	.....	8.013	14.423
Same (Spitzman's heading, 210 feet outside of 2 right entry).....	181	W68226	A	1	4.10	17.70	71.20	7.00	.77	.....	.....	.....	.....	.....	.....	7.715	13.887
Same (composite of samples W68178, W68181, W68217, W68218, and W68226).	181	30179	A	1	1.24	17.89	73.15	7.72	.95	.....	.....	.....	.....	.....	.....	7.881	14.186
				2	.....	18.11	74.07	7.82	.96	.....	.....	.....	.....	.....	.....	7.980	14.364
				3	.....	19.65	80.35	.....	1.04	.....	.....	.....	.....	.....	.....	8.657	15.583
Same (tipple sample of coal being loaded).....	181	W68182	C	1	2.10	18.40	70.80	8.70	.83	.....	.....	.....	.....	.....	.....	7.750	13.950
Same (tipple sample of coal being loaded).....	181	W68197	C	1	2.00	17.50	72.00	8.50	.83	.....	.....	.....	.....	.....	.....	7.760	13.968
Same (tipple sample of coal being loaded).....	181	W68216	C	1	1.90	17.30	72.10	8.70	.88	.....	.....	.....	.....	.....	.....	7.737	13.927
Same (tipple sample of coal being loaded).....	181	W68221	C	1	1.90	18.60	70.70	8.80	.83	.....	.....	.....	.....	.....	.....	7.763	13.973
Same (composite of samples W68182, W68197, W68216, and W68221).	181	30180	C	1	1.98	18.32	71.28	8.42	.90	.....	.....	.....	.....	.....	.....	7.920	14.256
				2	.....	18.69	72.72	8.59	.92	.....	.....	.....	.....	.....	.....	8.664	15.595
				3	.....	20.45	79.55	.....	1.01	.....	.....	.....	.....	.....	.....	7.522	13.540
Short Gap, 1 $\frac{1}{4}$ miles east of Clarysville; Stanton-Georges Creek No. 1 mine, Upper Freeport bed (face of 3 room, 4 right entry).	181	26521	B	1	3.30	16.19	70.89	9.62	1.35	.....	.....	.....	.....	.....	.....	7.773	14.002
				2	.....	16.74	73.31	9.95	1.40	.....	.....	.....	.....	.....	.....	8.639	15.550
				3	.....	18.59	81.41	.....	1.55	.....	.....	.....	.....	.....	.....	7.597	13.675
Westernport, $\frac{1}{2}$ mile north of Tacoma mine, Lower Kittanning bed (face of 8 room, 1 right heading).	182	26520	B	1	1.94	15.91	72.49	9.96	1.58	.....	.....	.....	.....	.....	.....	7.747	13.945
				2	.....	15.92	73.92	10.16	1.61	.....	.....	.....	.....	.....	.....	8.623	15.521
				3	.....	17.72	82.28	.....	1.79	.....	.....	.....	.....	.....	.....	.....	.....
GARRETT COUNTY.																	
Barnum; Monroe No. 1 mine, Lower Kittanning bed (right rib of 6 left heading, 50 feet from main heading).	182	26983	B	1	1.71	18.49	69.88	9.02	1.61	.....	.....	.....	.....	.....	.....	7.664	13.795
				2	.....	18.81	71.10	10.09	1.64	.....	.....	.....	.....	.....	.....	7.797	14.085
				3	.....	20.92	79.08	.....	1.82	.....	.....	.....	.....	.....	.....	8.672	15.610
Barlon; Monroe No. 2 mine, Bakerstown bed (face of 7 right heading, 1,200 feet northwest from entry).	183	26982	B	1	2.26	15.77	73.06	8.91	.61	.....	.....	.....	.....	.....	.....	7.726	13.907
				2	.....	16.13	74.75	9.12	.62	.....	.....	.....	.....	.....	.....	7.904	14.227
				3	.....	17.75	82.25	.....	.68	.....	.....	.....	.....	.....	.....	8.698	15.636

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory; all others were analyzed at the Pittsburgh Laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—(Continued).

Locality, bed, etc.	Mine notes a (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No. b	Kind. c	Condition. d	Moisture.	Volatile matter.	Fixed car- bon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British ther- mal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
MARYLAND—Continued.																
GARRETT COUNTY—continued.																
Bayard Station, $\frac{1}{2}$ mile east of; Nethkin mine, Upper Freeport bed (face of 2 left heading).	183	26524	B	1	3.18	19.20	67.65	9.97	1.51	4.40	77.10	1.20	5.82	2.3	7,480	13,464
				2	.....	19.83	69.87	10.30	1.56	4.18	79.63	1.24	3.09	.....	7,725	13,905
				3	.....	22.11	77.89	.....	1.74	4.66	88.77	1.38	3.45	.....	8,612	15,502
Blaine Station, $\frac{3}{4}$ mile east of; Hamill No. 2 mine, Lower Kittanning bed (face of air course, 2 left heading, at boundary line).	184	26980	B	1	1.83	16.50	71.69	9.98	2.46	4.29	78.70	1.28	3.29	1.2	7,635	13,743
				2	.....	16.81	73.02	10.17	2.51	4.17	80.16	1.30	1.69	.....	7,777	13,989
				3	.....	18.71	81.29	.....	2.79	4.64	89.23	1.45	1.89	.....	8,657	15,583
Blaine, 1 mile east of; Peerless No. 3 mine, Upper Freeport bed (face of 1 room, 5 left heading).	184	26981	B	1	1.76	18.08	72.42	7.74	1.80	4.33	80.77	1.36	4.00	1.1	7,884	14,191
				2	.....	18.40	73.72	7.88	1.83	4.20	82.22	1.38	2.49	.....	8,025	14,445
				3	.....	19.97	80.03	.....	1.99	4.56	89.25	1.50	2.70	.....	8,711	15,680
Bloomington, 1 mile west of; Bloomington No. 7 mine, Lower Kittanning bed (face of 6 room, 3 left heading).	184	26512	B	1	3.12	14.67	70.51	11.70	2.05	4.18	76.13	1.27	4.67	2.3	7,348	13,226
				2	.....	15.14	72.78	12.08	2.12	3.95	78.58	1.31	1.96	.....	7,585	13,653
				3	.....	17.22	82.78	.....	2.41	4.49	89.38	1.49	2.23	.....	8,627	15,529
Chaffee, 2 miles northwest of; Chaffee mine, Lower Kittanning bed (face of main heading).	185	26514	B	1	2.39	16.41	71.82	9.38	2.01	4.37	78.54	1.29	4.41	1.6	7,615	13,707
				2	.....	16.81	73.58	9.61	2.06	4.20	80.46	1.32	2.35	.....	7,802	14,044
				3	.....	18.60	81.40	.....	2.28	4.65	89.01	1.46	2.60	.....	8,631	15,536
Crellin, 2 miles southwest of; Guthrie mine, Lower Kittanning bed (face of 18 left room, main heading).	185	26989	B	1	2.66	22.99	63.62	10.73	2.06	4.76	75.74	1.41	5.30	2.0	7,450	13,410
				2	.....	23.62	65.36	11.02	2.12	4.58	77.81	1.45	3.02	.....	7,653	13,775
				3	.....	26.54	73.46	.....	2.38	5.15	87.44	1.63	3.40	.....	8,600	15,480
Friendsville, $1\frac{1}{2}$ miles south of; McCulloh mine, Lower Kittanning bed (face of new heading, 50 feet above old heading).	186	26519	B	1	3.63	22.91	62.05	11.41	3.96	4.75	73.19	1.30	5.39	2.8	7,297	13,135
				2	.....	23.77	64.39	11.84	4.11	4.51	75.95	1.35	2.24	.....	7,572	13,630
				3	.....	26.96	73.04	.....	4.66	5.12	86.15	1.53	2.54	.....	8,589	15,460
Gannons Station; Washington No. 5 mine, Bakerstown bed (face of 2 south heading).	186	26531	B	1	2.77	16.79	70.64	9.80	1.43	4.32	76.77	1.58	6.10	2.0	7,589	13,660
				2	.....	17.27	72.65	10.08	1.47	4.12	78.96	1.63	3.74	.....	7,805	14,049
				3	.....	19.21	80.79	.....	1.63	4.58	87.81	1.81	4.17	.....	8,680	15,624
Gorman, $1\frac{1}{2}$ miles east of; Strathmore mine, Upper Freeport bed (face of 7 room, 2 right heading).	187	26523	B	1	2.62	16.66	64.34	16.38	1.38	4.01	71.81	1.19	5.23	1.9	6,955	12,519
				2	.....	17.11	66.07	16.82	1.42	3.82	73.74	1.22	2.98	.....	7,142	12,866
				3	.....	20.57	79.43	.....	1.71	4.59	88.65	1.47	3.58	.....	8,586	15,455
Grantsville, $1\frac{1}{2}$ miles west of; Beachey's mine, Grantsville bed (face of 6 room, 2 right heading).	187	26541	B	1	3.30	21.88	66.86	7.96	1.18	4.61	78.34	1.43	6.48	2.4	7,657	13,783
				2	.....	22.63	69.14	8.23	1.22	4.38	81.01	1.48	3.68	.....	7,918	14,252
				3	.....	24.66	75.34	.....	1.33	4.77	88.28	1.61	4.01	.....	8,628	15,530

Harrison, 1 mile east of: Dodson No. 3 mine, Lower Kittanning bed (face of 4 butt entry, 1 left heading).	187	B	1	2.53	15.44	72.74	9.29	1.79	4.44	79.25	1.27	3.96	1.7	7.613	13.703
			2	.....	17.84	74.63	9.53	2.03	4.27	81.31	1.30	1.75	.....	7.811	14.060
			3	.....	15.81	82.49	.....	.....	4.72	89.87	1.44	.....	.....	8.633	15.539
1 mile west of: Dodson No. 5 mine, Upper Kittanning bed (face of 2 room, 1 right heading).	188	B	1	3.57	16.29	71.73	8.41	.66	4.38	79.13	1.43	5.99	2.8	7.630	13.734
			2	.....	16.89	74.39	8.72	.74	4.13	82.06	1.48	2.93	.....	7.912	14.242
			3	.....	18.50	81.50	.....	.....	4.52	89.99	1.62	3.22	.....	8.668	15.602
Hubbard, Ajax Hooking No. 1 mine, Lower Kittanning bed (face of 3 room, 1 right heading).	188	B	1	3.80	17.42	65.56	13.22	2.25	4.43	74.23	1.22	4.65	3.0	7.163	12.893
			2	.....	18.11	68.15	13.74	2.34	4.17	77.16	1.27	1.32	.....	7.446	13.403
			3	.....	20.99	79.01	.....	2.71	4.83	89.45	1.47	1.54	.....	8.632	15.538
Lonaconing, 2 miles northwest of: Koontz mine, Tyson bed (face of main heading).	189	B	1	3.30	21.16	69.79	5.75	1.14	4.70	80.27	1.62	6.52	2.5	7.906	14.231
			2	.....	21.88	72.17	5.95	1.18	4.48	83.01	1.68	3.70	.....	8.176	14.717
			3	.....	23.27	76.73	.....	1.25	4.76	88.26	1.79	3.94	.....	8.694	15.649
3 miles northwest of: new opening, Upper Freeport bed (face of main heading, 350 feet inside of opening).	189	B	1	1.40	17.74	59.54	22.40	3.16	3.70	66.04	1.17	3.53	.8	6.447	11.605
			2	.....	17.74	59.54	22.72	3.20	3.59	66.98	1.19	2.32	.....	6.539	11.770
			3	.....	22.96	77.04	.....	4.14	4.65	86.67	1.54	3.00	.....	8.461	15.230
Oakland, 4½ miles north of: Chisholm mine, Lower Kittanning bed (face of 1 room, 1 left heading).	189	B	1	4.47	20.10	67.72	7.65	1.42	4.79	81.39	1.37	7.08	3.2	7.374	13.633
			2	.....	21.16	70.89	8.01	1.49	4.49	81.39	1.37	3.25	.....	7.928	14.270
			3	.....	22.94	77.06	.....	1.62	4.88	88.48	1.49	3.53	.....	8.619	15.514
8 miles north of: John Sines mine, Mercer bed (face of main heading, 70 feet from mine mouth).	189	B	1	2.77	24.80	52.86	19.57	4.49	4.16	64.17	1.29	6.32	1.9	6.516	11.729
			2	.....	25.51	54.36	20.13	4.62	3.96	66.00	1.33	3.96	.....	6.760	12.064
			3	.....	31.94	68.06	.....	5.78	4.96	82.63	1.67	4.96	.....	8.391	15.104
6 miles northwest of: O. R. Leighton mine, "Galitzen" bed (face of heading in new opening, 60 feet from entry).	190	B	1	2.23	25.44	57.53	14.80	4.80	4.65	70.80	1.30	3.65	1.7	7.110	12.798
			2	.....	26.02	58.84	15.14	4.91	4.50	72.41	1.33	1.71	.....	7.272	13.090
			3	.....	30.66	69.34	.....	5.79	5.30	85.33	1.57	2.01	.....	8.569	15.424
6½ miles northwest of: Taylor Sines mine, Upper Freeport bed (left rib of main heading, west of left heading).	190	B	1	3.48	25.78	62.41	8.33	3.79	4.74	76.23	1.39	5.52	2.4	7.610	13.698
			2	.....	26.71	64.66	8.63	3.93	4.51	78.98	1.44	2.51	.....	7.885	14.193
			3	.....	29.23	70.77	.....	4.30	4.94	86.44	1.58	2.74	.....	8.630	15.534
3½ miles north of: E. Z. Fowler mine, "Galitzen" bed (face of main heading).	190	B	1	4.32	21.33	64.41	9.94	2.46	4.68	75.21	1.42	6.29	3.3	7.371	13.268
			2	.....	22.29	67.32	10.39	2.57	4.39	78.61	1.48	2.56	.....	7.704	13.867
			3	.....	24.87	75.13	.....	2.87	4.90	87.72	1.65	2.85	.....	8.537	15.475
Swallow Falls, 2 miles southwest of: J. W. Beeghly mine, "Galitzen" bed (face of 2 room, 1 left heading).	191	B	1	3.92	25.72	59.86	10.50	2.41	4.68	73.63	1.46	7.32	2.8	7.204	13.129
			2	.....	26.77	62.30	10.93	2.51	4.41	76.63	1.52	4.00	.....	7.592	13.666
			3	.....	30.05	69.95	.....	2.82	4.05	86.03	1.71	4.49	.....	8.324	15.343
1 mile east of: L. G. Shaeffer mine, Lower Kittanning bed (face of 2 room, 3 right heading).	191	B	1	3.03	27.78	57.69	11.50	3.73	4.84	73.64	1.23	3.06	2.1	7.288	13.118
			2	.....	28.65	59.49	11.86	3.85	4.64	75.94	1.27	2.44	.....	7.515	13.527
			3	.....	32.51	67.49	.....	4.37	5.26	86.16	1.44	2.77	.....	8.527	15.349
MISSISSIPPI.															
CHOCTAW COUNTY.															
Reform, ½ mile south of: Mississippi O. & G. C. J. S. mine (face of main entry, 100 feet from mine mouth).	191	B	1	47.20	24.99	21.28	6.53	.46	.....	.....	.....	.....	31.4	3.163	5.693
			2	.....	47.33	40.30	12.37	.87	.....	.....	.....	.....	.....	5.990	10.782
			3	.....	54.01	45.99	.....	.99	.....	.....	.....	.....	.....	6.886	12.305
Same.....	191	B	1	48.76	21.24	21.24	5.76	.42					37.3	3.093	5.567
			2		47.31	41.45	11.21	.82						6.036	10.865
			3		53.30	46.70		.92						6.800	12.240

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^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes a (page).	Sample.		Proximate.					Ultimate.					Calorific value.		
		Laboratory No. b	Kind. c	Condition. d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
MONTANA.																
BIG HORN COUNTY.																
Lodgegrass, 13 miles southeast of; sec. 33, T. 7 S., R. 37 E.; prospect, Carney bed (50 feet northwest of prospect opening).	192	*26149	B	1	22.52	32.20	40.23	5.05	0.30	.....	.....	.....	.....	14.8	5,050	9,090
				2	.....	41.56	51.92	6.52	.39	.....	.....	.....	.....	.....	6,518	11,732
				3	.....	44.46	55.54	.....	.42	.....	.....	.....	.....	.....	6,972	12,550
15 miles southeast of; prospect, Carney bed (face of main entry, 25 feet from prospect opening).	192	*29370	B	1	24.16	31.27	39.49	5.08	.38	6.33	53.11	0.98	34.12	16.3	4,965	8,937
				2	41.23	41.23	52.07	6.70	.50	4.81	70.03	1.29	16.67	.....	6,547	11,785
				3	.....	44.19	55.81	.....	.54	5.16	75.06	1.38	17.86	.....	7,017	12,631
BROADWATER COUNTY.																
Lombard, 1 mile west of; Western mine (face 1 stub room, north entry).	192	*28556	A	1	2.98	24.05	49.17	23.80	8.00	.....	.....	.....	.....	2.3	5,872	10,570
				2	.....	24.79	50.68	24.53	8.25	.....	.....	.....	.....	.....	6,052	10,894
				3	.....	32.85	67.15	.....	10.93	.....	.....	.....	.....	.....	8,019	14,434
Same.....	192	*28557	A	1	3.27	23.56	49.72	23.45	7.92	.....	.....	.....	.....	2.2	5,899	10,618
				2	.....	24.36	51.40	24.24	8.19	.....	.....	.....	.....	.....	6,098	10,976
				3	.....	32.16	67.84	.....	10.81	.....	.....	.....	.....	.....	8,049	14,488
CARBON COUNTY.																
Red Lodge; sec. 27, T. 7 S., R. 20 E.; Red Lodge No. 4 mine, No. 4 bed (face of 46 room, 10 east entry).	192	*29466	A	1	11.28	33.61	44.51	10.60	.72	.....	.....	.....	.....	6.3	5,797	10,435
Same (face of 45 room, 12 east entry).	192	*29467	A	1	11.12	33.62	44.81	10.45	.80	.....	.....	.....	.....	5.6	5,813	10,463
Same (face of 129 room, 9 east entry).	192	*29468	A	1	11.20	35.07	40.40	13.33	1.23	.....	.....	.....	.....	5.5	5,623	10,121
Same (face of 1 room, 8 east entry).	192	*29469	A	1	9.89	35.14	42.26	12.71	1.27	.....	.....	.....	.....	4.2	5,739	10,330
Same (composite of samples 29466 to 29469).....	192	*29470	A	1	10.77	34.21	43.17	11.85	1.00	5.25	59.25	1.28	21.37	5.4	5,746	10,343
				2	.....	38.34	48.38	13.28	1.12	4.54	66.40	1.43	13.23	.....	6,440	11,592
				3	.....	44.21	55.79	.....	1.29	5.24	76.57	1.65	15.25	.....	7,426	13,367
Washoe; Washoe mine, Bear Creek No. 3 bed (left neck of 9 room, 50 feet from 3 east entry).	193	*28622	A	1	10.48	34.92	45.56	9.04	.95	.....	.....	.....	.....	4.4	6,022	10,840
Same (upper end of parting in main north entry, near 4 east entry).	193	*28623	A	1	10.99	34.47	43.57	10.97	1.21	.....	.....	.....	.....	4.5	5,823	10,481
Same (20 feet from face in 1 east back entry).....	193	*28624	A	1	10.43	33.16	41.48	14.93	1.35	.....	.....	.....	.....	4.1	5,576	10,037

Same (left side neck of 13 room, 15 feet from 2 east entry).....	193	*28625	A	1	10.44	35.63	43.90	10.03	.97	5.58	59.77	1.29	21.02	3.8	5,970	10,746
Same (composite of samples 28622 to 28625).....	193	*28626	A	1	10.47	34.67	43.65	11.21	1.13	4.94	66.76	1.44	13.08	4.2	5,847	10,525
				2	.....	38.72	48.76	12.52	1.26	5.65	76.31	1.65	14.95	.....	6,531	11,756
				3	.....	44.26	55.74	.....	1.44	.....	.....	.....	.....	.....	7,466	13,439
GALLATIN COUNTY.																
Sec. 3, T. 9 S., R. 3 E.; prospect (face of drift, 30 feet from mouth; sample weathered).	194	*26729	B	1	7.88	35.56	47.40	9.16	1.07	.....	.....	.....	.....	3.6	6,272	11,290
				2	.....	38.60	51.46	9.94	1.16	.....	.....	.....	.....	.....	6,808	12,254
				3	.....	42.86	57.14	.....	1.29	.....	.....	.....	.....	.....	7,560	13,608
MUSSELSHELL COUNTY.																
Roundup, 1 mile west of; sec. 23, T. 8 N., R. 25 E.; Roundup A mine, Roundup bed (right rib, 20 feet from face of 40 room, 2 back entry, 2 west entry).	194	28999	A	1	14.95	32.34	44.65	8.06	.59	.....	.....	.....	.....	3.5	5,831	10,496
Same (face of 3 room, 1 north entry, 2 west entry, 15 feet from entry).	194	29000	A	1	13.68	33.48	46.02	6.82	.45	.....	.....	.....	.....	3.2	6,040	10,872
Same (north rib of 7 west parting, main slope).....	194	29001	A	1	12.91	32.62	45.95	8.52	.54	.....	.....	.....	.....	3.3	6,007	10,813
Same (south rib of main east entry, 200 feet west of pumps).....	194	29002	A	1	13.26	31.79	45.70	9.25	1.58	.....	.....	.....	.....	3.8	5,904	10,627
Same (face of main entry, 1 west entry, 600 feet from slope).....	194	29003	A	1	14.07	31.67	46.83	7.43	.41	.....	.....	.....	.....	3.5	5,873	10,571
Same (composite of samples 28999 to 29003).....	194	29004	A	1	13.56	32.86	45.53	8.05	.70	5.56	61.98	.98	22.73	3.5	5,937	10,687
				2	.....	38.02	52.67	9.31	.81	4.69	71.70	1.13	12.36	.....	6,869	12,364
				3	.....	41.92	58.08	.....	.89	5.17	79.06	1.25	13.63	.....	7,574	13,633
PHILLIPS COUNTY.																
Malta, 38 miles southeast of; sec. 18, T. 24 N., R. 33 E.; Spencer mine (face of main entry, 15 feet south of mine mouth).	195	*27221	B	1	24.06	26.76	22.80	26.38	.59	.....	.....	.....	.....	17.4	2,889	5,200
				2	.....	35.24	30.02	34.74	.78	.....	.....	.....	.....	.....	3,804	6,847
				3	.....	54.00	46.00	.....	1.20	.....	.....	.....	.....	.....	5,829	10,492
NEVADA.																
MINERAL COUNTY.																
35 miles south of Yerington, Lyon County; sec 1, T. 7 N., R. 27 E.; prospect (face of entry, 30 feet from mine mouth; coal weathered).	195	*30792	B	1	27.48	24.70	20.04	27.78	3.05	.....	.....	.....	.....	19.0	2,847	5,125
				2	.....	34.06	27.63	38.31	4.21	.....	.....	.....	.....	.....	3,926	7,067
				3	.....	55.21	44.79	.....	6.82	.....	.....	.....	.....	.....	6,364	11,455
NEW MEXICO.																
RIO ARriba COUNTY.																
Lumberton, 1½ miles southwest of; NE. ¼ sec. 8, T. 31 N., R. 1 W.; prospect (face of drift 50 feet from prospect mouth; slightly weathered).	195	31076	B	1	3.32	36.45	49.82	10.41	2.20	.....	.....	.....	.....	1.8	7,201	12,062
				2	.....	37.70	51.53	10.77	2.28	.....	.....	.....	.....	.....	7,448	13,406
				3	.....	42.25	57.75	.....	2.56	.....	.....	.....	.....	.....	8,847	15,025
Monero, 1 mile southwest of; SW. ¼ sec. 7, T. 31 N., R. 1 E.; Old Sims mine, Upper bed (face of entry, 135 feet from mine mouth; sample weathered).	196	29279	B	1	7.16	37.11	50.46	5.27	.65					2.1	6,738	12,164
				2		39.97	54.35	5.68							7,279	13,102
				3		42.38	57.62		.74						7,717	13,891

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Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes a (page).	Sample.			Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	15	16	Calories.	British thermal units.
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
NEW MEXICO—Continued.																	
SAN JUAN COUNTY.																	
Farmington, 18 miles northwest of; NW. $\frac{1}{4}$ sec. 22, T. 32 N., R. 13 W.; Bill Thomas mine, Carbonero bed (500 feet northwest of mine mouth).	196	29249	B	2	5.93	39.06	44.02	10.99	0.63	.....	.....	.....	.....	2.9	6,696	12,053	
18 miles northeast of; SE. $\frac{1}{4}$ sec. 21, T. 32 N., R. 13 W.; Jones mine, Carbonero bed (500 feet S. 60° W. from mine mouth).	196	29250	B	3	.....	41.52	46.80	11.68	.67	.....	.....	.....	.....	.....	7,118	12,812	
					6.93	47.01	52.99	.....	.76	.....	.....	.....	.....	.....	8,039	14,506	
16 miles northwest of; SW. $\frac{1}{4}$ sec. 28, T. 30 N., R. 15 W.; Marcelinus mine, Carbonero bed (main slope, 300 feet from mine mouth; slightly weathered)	197	29025	B	2	.....	40.96	43.04	11.91	1.32	.....	.....	.....	.....	3.3	6,460	11,628	
16 miles northwest of; NW. $\frac{1}{4}$ sec. 16, T. 30 N., R. 15 W.; prospect drift, Carbonero bed (face of entry, 50 feet from mouth; sample weathered).	197	29026	B	3	.....	46.97	53.03	12.80	1.42	.....	.....	.....	.....	.....	6,941	12,494	
25 miles west of; SW. $\frac{1}{4}$ sec. 21, T. 30 N., R. 16 W.; Ship Rock Indian School mine (350 feet down main entry and 150 feet up right entry).	198	29006	B	1	10.12	39.94	45.77	4.17	.85	.....	.....	.....	.....	2.1	6,674	12,014	
			2	2	.....	44.44	50.92	4.64	.95	.....	.....	.....	.....	.....	7,425	13,365	
			3	3	.....	46.60	53.40	.....	1.00	.....	.....	.....	.....	.....	7,787	14,017	
SOCORRO COUNTY.																	
Carthage; Government mine, Carthage bed (face of 3 room, 2 left entry, rise room).	198	30214	A	1	3.66	39.74	46.75	9.85	.99	.....	.....	.....	.....	2.2	7,142	12,856	
Same (face of 2 room, 22 slant entry, main entry).	198	30215	A	1	2.80	36.43	42.80	17.97	.65	.....	.....	.....	.....	1.4	6,498	11,696	
Same (composite of samples 30214 and 30215).	198	30216	A	2	3.19	37.96	45.10	13.75	.82	5.25	68.36	1.32	10.50	1.8	6,837	12,307	
			2	2	.....	39.21	46.59	14.20	.85	5.06	70.62	1.36	7.91	.....	7,063	12,713	
			3	3	.....	45.70	54.30	.....	.99	5.90	82.31	1.59	9.21	.....	8,232	14,818	
NORTH DAKOTA.																	
WARD COUNTY.																	
Burlington, $\frac{1}{2}$ mile east of; Conon mine, lignite bed (face of main entry; on rib, 700 feet east of mine mouth).	198	*31702	A	1	37.82	25.90	27.20	9.08	.25	.....	.....	.....	.....	30.8	3,392	6,106	

Same (face of 2 room, 2 east main entry, 800 feet from mine mouth).	198	*31703	A	1	37.54	24.20	27.72	10.54	.28	.....	.....	30.8	3,296	5,933
Same (face of 3 room, main back entry, 600 feet east of mine mouth).	198	*31704	A	1	35.60	24.15	28.39	11.86	.23	.....	.....	28.6	3,317	5,971
Same (composite of samples 31702 to 31704).	198	*31705	A	1	36.93	24.92	27.72	10.43	.22	6.39	37.36	30.1	3,339	6,010
				2	.....	39.51	43.95	16.54	.35	3.63	59.23	.....	5,294	9,529
				3	.....	47.34	52.66	.....	.42	4.35	70.97	.....	6,343	11,417
WILLIAMS COUNTY.														
Ray, 10 miles southwest of: sec. 29, T. 155 N., R. 96 W.; Pittsley mine, lignite bed (face of 1 left entry, 100 feet north of mine mouth).	199	*29251	B	1	42.34	24.95	28.69	3.93	.36	7.30	37.79	33.1	3,517	6,331
				2	.....	43.34	49.83	6.83	.63	4.50	65.64	.....	6,169	10,996
				3	.....	46.52	53.48	.....	.68	4.83	70.44	.....	6,557	11,803
Same.	199	*29253	B	1	41.91	25.46	27.28	5.35	.35	.....	.....	33.3	3,522	6,340
				2	.....	43.83	46.96	9.21	.60	.....	.....	.....	6,063	10,913
				3	.....	48.27	51.73	.....	.66	.....	.....	.....	6,078	12,020
Wheelock, 7 miles southeast of: sec. 29, T. 155 N., R. 97 W.; Jim Monuen mine, lignite bed (face of 2 left entry, 300 feet west of mine mouth).	200	*29252	B	1	42.09	25.04	24.40	8.47	1.32	7.10	35.17	.....	3,330	5,994
				2	.....	43.24	42.13	14.63	2.28	4.18	60.73	.....	5,750	10,350
				3	.....	50.65	49.35	.....	2.67	4.90	71.14	.....	6,736	12,125
OHIO.														
COLUMBIANA COUNTY.														
East Liverpool, 3 miles northeast of: sec. 36; Liverpool Township; Delaney mine, Middle Kittanning bed (65 feet north of mine mouth).	200	25592	B	1	4.33	36.75	54.31	4.61	1.46	.....	.....	1.7	7,589	13,660
				2	.....	38.41	56.77	4.82	1.53	.....	.....	.....	7,933	14,279
				3	.....	40.35	59.65	.....	1.61	.....	.....	.....	8,384	15,001
3½ miles northeast of: Duck mine, Middle Kittanning bed (50 feet northeast of mine mouth).	200	25589	B	1	5.08	35.78	53.15	5.99	2.07	.....	.....	2.7	7,412	13,342
				2	.....	37.69	56.00	6.31	2.18	.....	.....	.....	7,809	14,056
				3	.....	40.23	59.77	.....	2.33	.....	.....	.....	8,385	15,003
2¼ miles northeast of: N. ½ sec. 28; Gaston mine, Upper Freeport bed (65 feet from mine mouth).	201	25583	B	1	5.27	36.28	49.51	8.94	4.01	.....	.....	3.0	7,118	12,812
				2	.....	38.30	52.26	9.44	4.23	.....	.....	.....	7,514	13,525
				3	.....	42.29	57.71	.....	4.67	.....	.....	.....	8,297	14,935
1½ miles north of: sec. 33, center; Johnson mine, Middle Kittanning bed (50 feet north of mine mouth).	201	25588	B	1	4.79	34.83	52.95	7.43	1.79	5.39	73.99	1.38	7,329	13,192
				2	.....	36.58	55.62	7.80	1.88	3.10	77.71	1.45	7,608	13,886
				3	.....	39.67	60.33	.....	2.04	5.53	84.28	1.57	8,349	15,028
2½ miles north of: SW. ¼ sec. 28; Kinsey mine, Lower Freeport bed (65 feet north of mine mouth).	201	25585	B	1	3.58	38.47	47.48	10.47	4.49	5.39	72.04	1.56	7,138	12,848
				2	.....	39.90	49.24	10.86	4.66	5.18	70.64	1.62	7,403	13,325
				3	.....	44.76	55.24	.....	5.23	5.81	81.49	1.82	8,305	14,949
½ mile north of: sec. 24, center; Malone's mine, Lower Kittanning bed (15 feet northeast of mine mouth).	202	25590	B	1	2.66	41.73	43.99	11.62	8.03	.....	.....	1.2	7,085	12,753
				2	.....	42.87	45.19	11.94	8.25	.....	.....	.....	7,278	13,100
				3	.....	48.68	51.32	.....	9.37	.....	.....	.....	8,265	14,877
3¼ miles northeast of: SE. ¼ sec. 23; Moore's mine, Lower Freeport bed (60 feet southwest of mine mouth).	202	25586	B	1	4.27	36.43	47.66	11.64	3.04	.....	.....	2.2	6,977	12,559
				2	.....	38.05	49.79	12.16	3.18	.....	.....	.....	7,288	13,118
				3	.....	43.32	56.68	.....	3.62	.....	.....	.....	8,297	14,935
4 miles northeast of: W. ½ sec. 24; Smith mine, Middle Kittanning bed (125 feet east of mine mouth).	203	25584	B	1	4.03	36.69	53.03	6.25	2.61	5.46	74.65	1.64	7,495	13,493
				2		38.23	55.26	6.51	2.72	5.22	77.79	1.71	7,811	14,080
				3		40.89	59.11		2.91	5.58	83.20	1.83	8,385	15,039

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^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

JEFFERSON COUNTY.

Cream City, sec. 25; Cream City mine, Middle Kittanning bed (340 feet N. 20° E. from mine mouth).	207	25899	B	1	2.61	36.75	49.46	11.15	2.07	5.26	71.04	1.49	8.99	.7	7.156	12.884
				2	.....	37.15	50.80	11.45	2.13	5.10	72.97	1.53	6.82	.....	7.352	13.234
			B	3	.....	42.63	57.37	9.36	2.41	5.76	82.41	1.73	7.70	.....	8.363	14.945
Empire, 2½ miles southwest of; Knox Township; sec. 9; Culp's mine, Pittsburgh bed (275 feet S. 35° W. from mine mouth).	207	25784	B	1	3.18	38.11	49.35	9.36	4.02	.....	.....	.....	.....	1.0	7.187	12.937
				2	.....	39.36	50.97	9.67	4.15	.....	.....	.....	.....	.....	7.423	13.361
			B	3	.....	43.58	56.42	12.09	4.59	.....	.....	.....	.....	.....	8.218	14.792
Irondale, sec. 26; Banfield mine, Lower Freeport bed (250 feet S. 10° W. from mine mouth).	208	25785	B	1	4.26	35.55	48.10	12.63	2.36	.....	.....	.....	.....	2.5	6.941	12.494
				2	.....	37.13	50.24	12.63	2.46	.....	.....	.....	.....	.....	7.250	13.050
			B	3	.....	42.50	57.50	12.82	2.82	.....	.....	.....	.....	.....	8.298	14.936
Same, Banfield No. 3 mine, Lower Kittanning bed (400 feet S. 57° E. from mine mouth).	208	25787	B	1	3.44	37.17	46.71	12.68	7.30	.....	.....	.....	.....	2.1	6.907	12.433
				2	.....	38.49	48.38	13.13	7.56	.....	.....	.....	.....	.....	7.154	12.877
			B	3	.....	44.31	55.69	8.70	8.70	.....	.....	.....	.....	.....	8.235	14.823
Same, East Ohio No. 2 mine, Lower Kittanning bed (3,000 feet east of mine mouth).	209	25901	B	1	2.21	39.63	47.50	10.66	4.96	5.28	71.04	1.34	6.72	.7	7.236	13.025
				2	.....	40.53	48.57	10.66	5.07	5.14	72.65	1.37	4.87	.....	7.400	13.320
			B	3	.....	45.49	54.51	5.69	5.69	5.77	81.54	1.54	5.46	.....	8.305	14.949
Same, Nicholson mine, Upper Freeport bed (600 feet W. 10° S. from mine mouth).	209	25788	B	1	3.73	36.54	51.24	8.49	2.87	.....	.....	.....	.....	1.8	7.290	13.122
				2	.....	37.95	53.23	8.82	2.98	.....	.....	.....	.....	.....	7.372	13.630
			B	3	.....	41.62	58.38	3.27	3.27	.....	.....	.....	.....	.....	8.304	14.947
Yellow Creek, 5 miles south of; Knox Township; sec. 16; local mine, near New Somerset, Pittsburgh bed (150 feet S. 5° W. from mine mouth).	209	25786	B	1	3.37	37.86	48.78	9.99	3.94	.....	.....	.....	.....	1.4	7.178	12.920
				2	.....	39.17	50.49	10.34	4.08	.....	.....	.....	.....	.....	7.429	13.372
			B	3	.....	43.70	56.30	4.55	4.55	.....	.....	.....	.....	.....	8.246	14.915
Sec. 14; Yellow Creek mine, Upper Freeport bed (30 feet west of mine mouth).	210	25890	B	1	4.75	38.28	51.91	5.06	1.76	.....	.....	.....	.....	2.7	7.480	13.464
				2	.....	40.19	54.50	5.31	1.85	.....	.....	.....	.....	.....	7.853	14.135
			B	3	.....	42.44	57.56	1.95	1.95	.....	.....	.....	.....	.....	8.294	14.929
Same (50 feet southwest from opening).	.....	25891	B	1	3.43	36.26	49.57	10.74	5.05	5.15	69.66	1.37	8.03	1.5	7.068	12.722
				2	.....	37.55	51.33	11.12	5.23	4.94	72.13	1.42	5.16	.....	7.319	13.174
			B	3	.....	42.25	57.75	5.88	5.88	5.56	81.15	1.60	5.81	.....	8.235	14.823
Lehigh, 3,000 feet northeast of; sec. 14, T. 1 S., R. 10 E.; Folsom Morris No. 5 mine, McAlester bed (face of 1 south entry, 8½ slope, top entry).	211	30707	A	1	6.61	38.21	42.54	12.64	4.15	.....	.....	.....	.....	1.9	6.206	11.171
Same (face of 11 south entry, 5½ slope, bottom entry).	211	30708	A	1	6.98	38.31	42.35	12.36	3.71	.....	.....	.....	.....	2.1	6.229	11.212
Same (face of 4 south entry, 5½ slope, bottom entry).	211	30709	A	1	7.74	38.53	42.20	11.53	5.16	.....	.....	.....	.....	2.5	6.184	11.131
Same (face of 14 north entry, 5 slope, top entry).	211	30710	A	1	6.57	39.75	42.03	11.65	3.68	.....	.....	.....	.....	2.0	6.209	11.284
Same (face of 13 north entry, 5 slope, top entry).	211	30711	A	1	6.17	39.26	42.67	11.90	4.54	.....	.....	.....	.....	1.6	6.206	11.333
Same (composite of samples 30707 to 30711).	211	30712	A	1	6.59	38.62	42.87	11.92	4.27	5.01	62.75	1.52	14.53	2.0	6.258	11.264
				2		41.34	45.90	12.76	4.57	4.58	67.17	1.63	9.29		6.099	12.038
			B	3		47.39	52.61	5.24	5.24	5.25	77.00	1.87	10.64		7.679	13.822

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^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

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Same (face of 7 east entry, main slope entry).....	214	W69355	A	1	2.40	22.55	67.53	7.52	78							7.761	13.970
				2	.....	23.10	69.20	7.70	.80	.....	.....	.....	.....	.....	.....	7.956	14.320
				3	.....	25.03	74.97	.....	.87	.....	.....	.....	.....	.....	.....	8.617	15.510
Same (face of 6 east entry, main slope entry).....	214	W69356	A	1	2.90	22.62	67.10	7.38	.83	.....	.....	.....	.....	.....	.....	7.750	13.950
				2	.....	23.30	69.10	7.60	.85	.....	.....	.....	.....	.....	.....	7.978	14.360
				3	.....	25.22	74.78	.....	.92	.....	.....	.....	.....	.....	.....	8.639	15.550
1½ miles west of: sec 21, T. 8 N., R. 22 E.; Blue Ridge No. 4 mine, Panama bed (left north rib, 40 feet from face of main slope). Same (face of 4 west entry, main slope entry).....	214	29840	A	1	2.28	22.82	68.00	6.90	.91	.....	.....	.....	.....	.....	.....	7.801	14.042
Same (composite of samples 29840 and 29841).....	214	29841	A	1	3.71	22.57	68.72	5.00	1.04	.....	.....	.....	.....	.....	.....	7.904	14.227
		29843	A	1	3.02	22.75	68.22	6.00	.99	.....	.....	.....	.....	.....	.....	7.860	14.148
				2	.....	23.46	70.35	6.19	1.02	.....	.....	.....	.....	.....	.....	8.104	14.587
				3	.....	25.01	74.99	.....	1.09	.....	.....	.....	.....	.....	.....	8.639	15.550
Same (face of 5 east entry, main slope entry).....	214	W69349	A	1	2.50	23.50	66.49	7.51	.73	.....	.....	.....	.....	.....	.....	7.728	13.910
				2	.....	24.10	68.20	7.70	.75	.....	.....	.....	.....	.....	.....	7.928	14.270
				3	.....	26.11	73.89	.....	.81	.....	.....	.....	.....	.....	.....	8.589	15.460
Same (face of 4 west entry, main slope entry).....	214	W69350	A	1	3.20	22.65	66.21	7.94	.92	.....	.....	.....	.....	.....	.....	7.672	13.810
				2	.....	23.40	68.40	8.20	.95	.....	.....	.....	.....	.....	.....	7.928	14.270
				3	.....	25.49	74.51	.....	1.03	.....	.....	.....	.....	.....	.....	8.639	15.550
Same (face of 5 room, 4 east entry, main slope entry).....	214	W69351	A	1	2.60	23.57	67.40	6.43	.78	.....	.....	.....	.....	.....	.....	7.822	14.050
				2	.....	24.20	69.20	6.60	.80	.....	.....	.....	.....	.....	.....	8.028	14.450
				3	.....	25.91	74.09	.....	.86	.....	.....	.....	.....	.....	.....	8.595	15.470
Same (face of 5 west entry, main slope entry).....	214	W69352	A	1	2.90	22.92	67.77	6.41	.83	.....	.....	.....	.....	.....	.....	7.778	14.000
				2	.....	23.60	69.80	6.60	.85	.....	.....	.....	.....	.....	.....	8.011	14.420
				3	.....	25.27	74.73	.....	.91	.....	.....	.....	.....	.....	.....	8.578	15.440
Same (tipple samples of lump coal over 1-inch bar screen).....	214	W69412	C	1	1.63	21.94	60.74	15.69	.73	.....	.....	.....	.....	.....	.....	7.050	12.690
		W69416	C	2	.....	22.30	61.75	15.95	.74	.....	.....	.....	.....	.....	.....	7.167	12.900
		W69417	C	3	.....	26.53	73.47	.....	.88	.....	.....	.....	.....	.....	.....	8.527	15.348
Same (tipple sample of slack coal through 1-inch bar screen).....	214	W69415	C	1	4.00	20.74	58.03	17.23	.77	.....	.....	.....	.....	.....	.....	6.709	12.077
		W69419	C	2	.....	21.60	60.45	17.95	.98	.....	.....	.....	.....	.....	.....	6.989	12.880
				3	.....	26.33	73.67	.....	.73	.....	.....	.....	.....	.....	.....	8.518	15.332
1 mile west of: Blue Ridge No. 5 mine, I'anama bed (face of 2 west entry, main slope entry). Same (face of 3 room, 2 east entry, main slope entry).....	216	29839	A	1	3.57	22.53	66.04	7.86	.73	.....	.....	.....	.....	.....	.....	7.652	13.774
Same (composite of samples 29839 and 29842).....	216	29842	A	1	3.44	21.38	68.58	6.60	1.01	.....	.....	.....	.....	.....	.....	7.801	14.042
		29844	A	1	3.61	21.78	67.29	7.32	.86	.....	.....	.....	.....	.....	.....	7.706	13.871
				2	.....	22.60	69.81	7.59	.89	.....	.....	.....	.....	.....	.....	7.997	14.991
				3	.....	24.46	75.54	.....	.96	.....	.....	.....	.....	.....	.....	8.631	13.572
Stigler, 2 miles from: Turner strip pit, Stigler (McAlester) bed (near north end of pit).	217	26323	B	1	3.75	27.14	66.59	2.52	.63	.....	.....	.....	.....	.....	.....	8.134	14.641
				2	.....	28.20	69.18	2.62	.65	.....	.....	.....	.....	.....	.....	8.451	15.212
				3	.....	28.96	71.04	.....	.69	.....	.....	.....	.....	.....	.....	8.678	15.820
3 miles northwest of: sec. 5, T. 9 N., R. 21 E.; strip pit, Stigler bed (face of workings).	217	30344	A	1	3.07	26.11	66.27	4.55	.69							7.972	14.550
				2		26.94	68.37	4.69	.71							8.225	14.805
				3		28.27	71.73		.74							8.630	15.534

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Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes <i>a</i> (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
OKLAHOMA—Continued.																
HASKELL COUNTY—continued.																
Tamaha, 3½ miles from; Nunnally strip pit, Stigler (McAlester) bed (at face of pit).	217	26324	B	1	3.04	21.32	69.58	6.06	3.83	.....	.....	.....	.....	2.7	7,934	14,281
Near sec. 19, T. 11 N., R. 22 E.; Old Slope mine, Stigler bed (near mouth of slope; mine not in operation).	217	30706	A	3	.....	21.99	71.76	6.25	3.95	.....	.....	.....	.....	.....	8,183	14,729
					5.52	22.67	64.17	7.64	4.21	.....	.....	.....	.....	3.6	7,403	13,325
					.....	23.99	67.92	8.09	3.40	.....	.....	.....	.....	.....	7,835	14,103
					.....	26.10	73.90	.....	3.92	.....	.....	.....	.....	.....	8,624	15,343
Whitefield, 1 mile south and 1 mile west of; sec. 24; Ligon strip pit, Stigler (?) bed (face of workings).	217	26325	B	1	3.88	29.70	63.90	2.52	1.38	.....	.....	.....	.....	2.9	8,073	14,531
					.....	30.90	66.48	2.62	1.44	.....	.....	.....	.....	.....	8,399	15,118
					.....	31.73	68.27	.....	1.48	.....	.....	.....	.....	.....	8,625	15,525
LATIMER COUNTY.																
Degnan, ¾ mile west of; M. K. & T. No. 19 mine, Lower Hartshorne bed (face of 3 east entry, main slope entry).	218	W69530	A	1	11.20	33.48	46.62	8.70	1.78	.....	.....	.....	.....	.....	6,650	11,970
					.....	37.70	52.50	9.80	2.00	.....	.....	.....	.....	.....	7,483	13,470
					.....	41.79	58.21	.....	2.22	.....	.....	.....	.....	.....	7,995	14,390
Same (face of 2 east entry, inside plane entry).....	218	W69542	A	1	2.90	36.12	55.64	5.34	.83	.....	.....	.....	.....	.....	7,689	13,840
					.....	37.20	57.30	5.50	.85	.....	.....	.....	.....	.....	7,917	14,250
					.....	39.37	60.63	.....	.90	.....	.....	.....	.....	.....	8,378	15,080
Same (face of 4 east entry, main slope entry).....	218	W69547	A	1	3.70	36.88	53.83	5.59	.87	.....	.....	.....	.....	.....	7,572	13,630
					.....	38.30	55.90	5.80	.90	.....	.....	.....	.....	.....	7,861	14,150
					.....	40.66	59.34	.....	.96	.....	.....	.....	.....	.....	8,345	15,020
Same (face of 5 east entry, main slope entry).....	218	W69552	A	1	2.90	34.76	53.41	8.93	1.21	.....	.....	.....	.....	.....	7,389	13,300
					.....	35.80	55.00	9.20	1.25	.....	.....	.....	.....	.....	7,611	13,700
					.....	39.43	60.57	.....	1.38	.....	.....	.....	.....	.....	8,383	15,090
Same (face of 1 east entry, inside plane entry).....	215	W69560	A	1	4.20	36.88	53.46	5.46	.81	.....	.....	.....	.....	.....	7,480	13,480
					.....	38.50	55.80	5.70	.85	.....	.....	.....	.....	.....	7,817	14,070
					.....	40.83	59.17	.....	.90	.....	.....	.....	.....	.....	8,289	14,920
					2.55	37.32	53.60	6.53	.97	.....	.....	.....	.....	.....	7,569	13,624
Same (tipple sample of lump coal over 2½-inch screen).....	218	W69532 W69533	C	1 2 3	.....	38.30	55.00	6.70	1.00	.....	.....	.....	.....	.....	7,767	13,980
					.....	41.05	58.95	.....	1.07	.....	.....	.....	.....	.....	8,325	14,984

Same (tipple sample of nut coal through 2½-inch and over 1½-inch screen).	218	W69541 W69544	C	1	2.40	35.82	51.68	10.10	1.05	.....	.....	7,315	13,166
				2	.....	36.70	52.95	10.35	1.08	.....	.....	7,495	13,490
				3	.....	40.94	59.06	.....	1.20	.....	.....	8,360	15,047
Same (tipple sample of slack coal through 1½-inch screen).	218	W69543 W69548	C	1	4.75	34.77	51.43	9.05	.98	.....	.....	7,205	12,968
				2	.....	36.50	54.00	9.50	1.03	.....	.....	7,564	13,615
				3	.....	40.33	59.67	.....	1.14	.....	.....	8,358	15,044
Gowen, 1 mile west of; secs. 22, 23, 26, 27, T. 5 N., R. 17 E.; Rock Island No. 40 mine, Lower Hartshorne bed (face of 5 room, 9 west entry, 41 slope entry).	218	30270	A	1	3.84	37.26	52.36	6.54	1.39	.....	2.3	7,453	13,415
													
													
Same (face of 15 room, 7 west entry, 41 slope entry).	218	30271	A	1	3.46	39.24	50.41	6.89	.86	.....	.....	7,391	13,304
													
													
Same (face of 8 east entry, 41 slope entry).	218	30272	A	1	4.40	36.80	51.36	7.44	1.28	.....	.....	7,318	13,172
													
													
Same (face of 50 room, 6 west entry, 40 slope entry).	218	30273	A	1	4.08	38.81	51.32	5.79	1.91	.....	.....	7,491	13,454
													
													
Same (face of 5 east air course, 41 slope entry).	218	30274	A	1	3.92	38.36	52.44	5.28	1.14	.....	.....	7,529	13,552
													
													
Same (face of 6 east entry, 41 slope entry).	218	30275	A	1	4.09	38.64	50.76	6.51	2.20	.....	.....	7,449	13,408
													
													
Same (face of 5 west entry, 41 slope entry).	218	30276	A	1	3.97	37.71	50.65	7.67	1.02	.....	.....	7,311	13,160
													
													
Same (composite of samples 30270 to 30276).	218	30277	A	1	3.89	38.14	51.41	6.56	1.44	.....	.....	7,420	13,356
													
													
Red Oak, 3½ miles southeast of; Hilling No. 2 mine, Lower Hartshorne bed (face of 2 east air course, main slope entry).	219	W69613	A	1	6.00	31.02	58.66	4.32	1.13	.....	.....	7,721	13,898
													
													
Same (face of 2 east air course, main slope entry).	219	W69630	A	1	.....	33.00	62.40	4.60	1.20	.....	.....	8,083	14,550
													
													
Same (face of east plane entry, main slope entry).	219	W69634	A	1	3.90	32.10	59.77	4.23	1.25	.....	.....	8,472	15,250
													
													
Same (face of 1 east entry, main slope entry).	219	W69634	A	1	4.20	31.81	59.97	4.02	1.01	.....	.....	8,061	14,510
													
													
Same (tipple samples of coal being loaded).	219	W69611 W69622 W69629	C	1	2.38	32.46	58.13	7.03	1.16	.....	.....	7,668	13,808
													
													
Wilburton, ¼ mile west of; sec. 8, T. 5 N., R. 19 E.; New No. 5 mine, Upper Hartshorne bed (face of 12 west entry, where 17 room will be turned).	220	27531	A	1	4.11	37.15	53.34	5.40	.92	.....	.....	7,527	13,549
													
													
Same (face of 2 room, A entry).	220	27532	A	1	3.54	37.73	53.74	4.99	.85	.....	.....	7,634	13,741
													
													
Same (face of 3 room, B entry).	220	27533	A	1	3.35	37.09	54.57	4.99	1.16	.....	.....	7,649	13,768
													
													
Same (face of 15 room, 10 east entry).	220	27534	A	1	3.67	37.86	53.98	4.49	.86	.....	.....	7,638	13,748
													
													
Same (composite of samples 27531 to 27534).	220	27535	A	1	3.68	37.41	53.85	5.06	.96	.....	.....	7,604	13,687
													
													
Same (face of 6 east entry).	220	W69509	A	1	.....	38.84	55.91	5.25	1.00	.....	.....	7,894	14,299
													
													
Same (face of main east entry).	220	W69510	A	1	3.40	35.84	54.77	5.99	1.01	.....	.....	7,831	14,096
													
													
Same (face of main east entry).	220	W69510	A	1	3.60	37.98	52.73	5.69	.82			7,756	13,980
													
													
Same (face of main east entry).	220	W69510	A	1		39.40	54.70	5.90	.85			8,272	14,890
													
													

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 c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.
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Same (face of 11 west entry, main slope entry).....	222	W69470	A	1	1.90	21.97	62.59	13.54	3.78	7,267	13,080
				2	2	22.40	63.80	3.85	4.47	7,406	13,330
				3	3	25.99	74.01	4.47	5.17	7,595	15,470
Same (face of 8 east entry, main slope entry).....	222	W69473	A	1	1.50	22.56	62.25	13.69	6.25	8,239	13,030
				2	2	22.90	63.20	13.90	6.35	7,350	13,230
				3	3	26.60	73.40	7.37	7.37	7,539	15,370
Same (tippie samples of lump coal over 8-inch bar screen).....	222	W69463 W69453	C	1	.65	22.70	65.67	10.98	3.66	8,650	13,770
				2	2	22.85	66.10	11.05	3.68	7,700	13,860
				3	3	25.69	74.31	.....	4.14	8,657	15,582
Same (tippie samples of run-of-mine coal through 8-inch bar screen).....	222	W69460 W69462 W69478 W69480	C	1	.78	21.43	60.64	17.15	4.25	7,080	12,743
				2	2	21.60	61.12	17.28	4.28	7,135	12,843
				3	3	26.11	73.89	.....	5.17	8,626	15,525
Howe, 3 miles southwest of No. 3 mine, Lower Hartshorne bed; (face of 4 west entry, main slope entry).....	223	W69464	A	1	3.50	18.53	69.96	8.01	.77	7,628	13,730
				2	2	19.20	72.50	8.30	.80	7,906	14,230
				3	3	20.94	79.06	.....	.87	8,622	15,520
Same (face of 6 west entry).....	223	W69465	A	1	3.80	18.66	70.23	7.31	.82	7,633	13,740
				2	2	19.40	73.00	7.60	.85	7,933	14,280
				3	3	21.00	79.00	.....	.92	8,583	15,450
Same (face of 30 room, 5 entry, main slope entry).....	223	W69482	A	1	2.50	19.11	71.66	6.73	.54	7,800	14,040
				2	2	19.60	73.50	6.90	.55	8,000	14,400
				3	3	21.05	78.95	.....	.59	8,395	15,470
Same (tippie samples of run-of-mine coal).....	223	W69466 W69467 W69479 W69485	C	1	3.05	18.64	64.54	13.77	.73	7,057	12,703
				2	2	19.23	66.57	14.20	.75	7,290	13,103
				3	3	22.41	77.59	.....	.87	8,455	15,272
Williams, 1 mile west of No. 1 mine, Lower Hartshorne bed (face of 6 west entry, main slope entry).....	224	W69409	A	1	1.80	16.50	73.94	7.76	.54	7,980	14,040
				2	2	16.80	75.30	7.90	.55	7,939	14,290
				3	3	18.24	81.76	.....	.60	8,617	15,510
Same (face of 7 west entry, main slope entry).....	224	W69410	A	1	1.90	17.27	73.08	7.75	.59	7,783	14,010
				2	2	17.60	74.50	7.90	.60	7,939	14,290
				3	3	19.11	80.89	.....	.65	8,622	15,520
Same (face of 8 west entry, main slope entry).....	224	W69411	A	1	1.90	16.87	73.97	7.26	.64	7,833	14,100
				2	2	17.20	75.40	7.40	.65	7,989	14,380
				3	3	18.57	81.43	.....	.70	8,628	15,530
Same (tippie samples of lump coal over 2½-inch screen).....	224	W69407 W69408	C	1	1.70	17.35	71.76	9.19	.59	7,676	13,816
				2	2	17.65	73.00	9.35	.60	7,808	14,055
				3	3	19.47	80.53	.....	.66	8,614	15,505
Same (tippie samples of nut coal through 2½-inch and over 1½-inch screen).....	224	W69406 W69420	C	1	1.95	15.49	59.13	23.43	.81	6,251	11,251
				2	2	15.80	60.30	23.90	.83	6,375	11,475
				3	3	20.76	79.24	.....	1.09	8,377	15,079
Same (tippie samples of slack coal through 1½-inch screen).....	224	W69413 W69414	C	1	1.95	16.82	68.24	12.99	.62	7,283	13,100
				2	2	17.15	69.60	13.25	.63	7,428	13,370
				3	3	19.77	80.23		.73	8,502	15,412

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^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

dz The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free. *es* Geological survey, or of a State geological survey, *C*=cat sample taken at the melting plant or in the field.

Table of chemical analyses—(Continued.)

Locality, bed, etc.	Mine notes a (page).	Sample.		Proximate.						Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
OKLAHOMA—Continued.																
PITTSBURG COUNTY.																
Alderson, $\frac{1}{4}$ mile southwest of; sec. 22, T. 5 N., R. 15 E.; Rock Island No. 5 mine, McAlester bed (face of 5 east entry, main west slope entry).	225	30660	A	1	2.92	37.53	54.32	5.23	0.53					0.9	7,645	13,761
Same (face of 5 west entry, main west slope entry)	225	30661	A	1	2.59	38.28	54.59	4.54	.80					.9	7,746	13,943
Same (face of 7 east entry, main west slope entry)	225	30662	A	1	2.92	37.42	52.63	7.03	.57					1.1	7,479	13,462
Same (face of 3 west entry, main west slope entry)	225	30663	A	1	2.70	39.52	53.44	4.34	.88					1.0	7,758	13,964
Same (face of 9 west entry, main west slope entry)	225	30664	A	1	2.79	39.81	53.08	4.32	.65					1.0	7,760	13,968
Same (face of 4 west entry, 1 east slope entry)	225	30665	A	1	2.70	38.87	54.24	4.19	.57					.8	7,777	13,999
Same (face of 5 east entry, 1 east slope entry)	225	30666	A	1	2.90	37.77	54.47	4.86	.94					1.0	7,712	13,882
Same (composite of samples 30660 to 30666)	225	30667	A	2	2.73	38.20	54.15	4.92	.71	5.35	77.35	1.93	9.74	1.0	7,704	13,867
				1		39.27	55.67	5.06	.77	5.19	79.52	1.98	7.52		7,920	14,256
				3		41.36	58.64		.77	5.47	83.76	2.09	7.91		8,342	15,016
$\frac{1}{2}$ mile east of; secs. 24 and 19, T. 5 N., R. 15 and 16 E.; Rock Island No. 38 mine, McAlester bed (face of 9 west entry, main slope entry).	226	30656	A	1	2.86	37.24	54.64	5.26	.57					1.0	7,659	13,786
Same (face of 6 east entry, main slope entry)	226	30657	A	1	3.26	37.48	55.02	4.24	.51					1.3	7,706	13,871
Same (face of main east entry, main slope entry)	226	30658	A	1	2.57	38.27	54.62	4.54	.52					.6	7,732	13,918
Same (composite of samples 30656 to 30658)	226	30659	A	1	2.76	37.79	54.62	4.83	.52	5.31	77.44	1.89	10.01	1.0	7,691	13,844
				2		38.86	56.17	4.97	.53	5.14	79.64	1.94	7.78		7,909	14,236
				3		40.89	59.11		.56	5.41	83.81	2.04	8.18		8,323	14,981
Buck, 1 mile east of; sec. 12, T. 5 N., R. 15 E.; Buck No. 22 mine, Upper Hartshorne bed (face of 1 east bottom entry, 6 feet from face of slope).	226	26150	A	1	5.32	32.90	57.25	4.53	1.59					3.6	7,548	13,586
Carbon, 1 mile east of; Carbon No. 2 mine, McAlester bed (face of 5 west entry, main slope entry).	227	W69527	A	2		31.75	60.47	4.78	1.68						7,972	14,350
				3		36.49	63.51		.39						8,372	15,070
				1	3.10	32.56	56.68	7.66	.39						7,295	13,130
				2		33.60	58.50	7.90	.40						7,522	13,540
				3		36.48	63.52		.43						8,167	14,700
Same (face of 7 east entry, main slope entry).	227	W69535	A	1	2.80	31.70	57.35	5.15	.39						7,600	13,680
				2		35.70	59.00	5.30	.40						7,822	14,080
				3		37.70	62.30		.42						8,261	14,870
Same (face of 6 west entry, main slope entry)	227	W69546	A	1	2.90	31.08	57.49	5.53	.53						7,572	13,630
				2		35.10	59.20	5.70	.55						7,795	14,030
				3		37.22	62.78		.58						8,267	14,890

[illegible]

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The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.			Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.			Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
OKLAHOMA—Continued.																	
PITTSBURG COUNTY—continued.																	
Ridgeway, $\frac{1}{2}$ mile east of; sec. 33, T. 5 N., R. 17 E.; Rock Island No. 10 mine, Lower Hartshorne bed (face of main east entry).	230	30222	A	1	3.14	37.50	50.26	9.10	1.57	.....	.....	.....	.....	1.7	7,238	13,028	
Same (face of main west entry).....	230	30223	A	1	3.36	37.26	50.76	8.62	1.84	.....	.....	.....	.....	1.8	7,341	13,214	
Same (face of 27 room, main west entry).....	230	30224	A	1	2.84	39.70	49.94	7.52	1.67	.....	.....	.....	.....	1.4	7,469	13,444	
Same (face of east air course, main north entry).....	230	30225	A	1	5.84	36.80	51.38	5.98	1.60	.....	.....	.....	.....	4.2	7,309	13,156	
Same (face of 6 east entry, main south entry).....	230	30226	A	1	2.88	38.88	51.97	6.27	1.53	.....	.....	.....	.....	1.3	7,512	13,576	
Same (composite of samples 30222 to 30226).....	230	30227	A	2	3.77	38.00	50.61	7.62	1.71	5.35	73.84	1.85	9.63	2.1	7,380	13,284	
				3	.....	39.49	52.59	7.92	1.78	5.12	76.73	1.92	6.53	.....	7,669	13,804	
					.....	42.89	57.11	.....	1.93	5.56	83.33	2.09	7.09	.....	8,329	14,992	
SEQUOYAH COUNTY.																	
Hanson, 1 mile north of; sec. 6, T. 11, R. 25 E.; Brewer strip pit (face of north edge of pit).	231	26800	B	1	5.30	16.78	72.47	5.45	1.72	.....	.....	.....	.....	4.9	7,769	13,984	
WAGONER COUNTY.																	
Redbird, $\frac{1}{4}$ miles northeast of; Kirk strip pit (face of stripping).....	231	26348	B	1	3.86	36.14	46.34	13.66	6.53	.....	.....	.....	.....	2.3	6,842	12,316	
			2	.....	.....	37.59	48.20	14.21	6.79	.....	.....	.....	.....	.....	7,117	12,811	
			3	.....	.....	43.81	56.19	.....	7.91	.....	.....	.....	.....	.....	8,296	14,933	
OREGON.																	
COOS COUNTY.																	
Beaver Hill; sec. 17, T. 27 S., R. 13 W.; Beaver Hill mine, Newport bed (face of 8 north gangway).	231	*27951	A	1	16.77	33.43	40.15	9.65	.78	.....	.....	.....	.....	7.0	5,233	9,419	
			2	.....	.....	40.17	48.24	11.59	.94	.....	.....	.....	.....	.....	6,287	11,317	
			3	.....	.....	45.44	54.56	.....	1.06	.....	.....	.....	.....	.....	7,111	12,800	
Henryville; Henryville mine, Newport bed (face of 2 south gangway)....	232	*27956	A	1	16.17	34.96	40.66	8.21	.72	.....	.....	.....	.....	5.1	5,416	9,749	
			2	.....	.....	41.70	48.51	9.79	.86	.....	.....	.....	.....	.....	6,461	11,630	
			3	.....	.....	46.22	53.78	.....	.95	.....	.....	.....	.....	.....	7,162	12,892	

PENNsylvania.

ALLEGHENY COUNTY.

Location	Room	Entrance	Area	Volume	Weight	Value	Notes
Creighton; Creighton mine, Upper and Lower Freeport beds (rib of 1 room, 100 feet from chute, between 10 entry and line air course).	26932	A	1	3.23	35.19	54.23	7.35
	26933	A	1	2.74	33.10	52.19	11.97
	26990	A	1	2.76	33.23	53.62	1.04
	26991	A	1	2.84	34.24	51.92	1.10
Same (face of 1 room, 103 entry, 20 feet in by 1 crosscut).	26992	A	2	2.86	33.83	53.11	10.20
					34.82	54.68	10.50
					38.90	61.10	1.15
					32.73	53.87	1.28
Same (composite of samples 26932, 26933, 26990, and 26991).	26934	A	2	2.98	32.73	53.23	11.06
					33.73	54.87	1.48
					38.07	61.93	1.73
					28.19	35.31	35.20
Same (C face, 300 feet in by old 8 right entry; cannel coal).	27088	A	2	1.85	29.19	35.31	35.50
					45.26	54.74	1.49
ARMSTRONG COUNTY.	28664	B	1	3.11	36.63	49.98	10.28
	28665	B	1	2.86	40.47	46.82	9.85
	28666	B	2	3.09	38.18	48.73	10.00
					39.40	50.28	10.32
Ford City, 1 mile southwest of; Campbell mine, Upper Kittanning bed (face of 2 right entry, 50 feet from main entry).	30289	A	1	2.14	31.65	50.09	16.12
	30290	A	1	2.31	31.51	47.60	18.58
	30291	A	1	2.36	31.62	49.94	16.08
	30292	A	2	2.26	31.45	49.27	17.02
Same (face of 3 right entry, 20 feet from main entry).					32.18	50.41	17.41
					38.96	51.04	3.15
					35.24	51.56	10.74
					34.84	51.47	10.53
Logansport; Raridan mine, Upper Freeport bed (face of main entry, 1,200 feet east from mouth).	28667	B	1	3.38	35.24	51.04	10.21
	28668	B	1	2.66	35.04	51.56	10.74
	28669	B	1	3.16	34.84	51.47	10.53
					35.98	53.15	10.87
Same (composite of samples 28667 and 28668).					40.37	59.63	3.75
					33.06	36.97	28.28
					32.78	37.12	28.31
					32.81	37.26	28.18
Montgomeryville; Montgomeryville mine, Middle Kittanning bed (face of 6 room, 1 left entry, cannel coal).	28774	B	1	1.69	33.06	36.97	28.28
	28775	B	1	1.79	32.78	37.12	28.31
	28776	B	1	1.75	32.81	37.26	28.18
					33.39	37.93	28.68
Same (face of crosscut, 2 left entry).					46.82	53.18	5.20

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BUTLER COUNTY.																
Evans City, 6 miles north of; Young Shaft mine, Upper Freeport bed (200 feet northwest of shaft).....	238	25823	B	1	3.46	41.43	49.75	5.36	3.58	5.38	74.84	1.16	9.68	2.1	7,585	13,653
				2	.....	42.91	51.54	5.55	3.71	5.18	77.52	1.20	6.84	.....	7,857	14,143
				3	.....	45.43	54.57	.....	3.93	5.48	82.08	1.27	7.24	.....	8,319	14,974
Goff Station, 1 mile east of; Annandale No. 2 mine, Brookville bed (face of 2 main entry).....	238	26241	A	1	2.98	36.87	44.07	16.08	3.84	.....	.....	.....	.....	1.5	6,673	12,011
Same (face of 3 room, 2 right main entry).....	238	26242	A	1	2.92	37.66	46.46	12.96	3.22	.....	.....	.....	.....	1.3	6,950	12,510
	238	26243	A	1	3.45	37.20	44.38	14.97	3.91	.....	.....	.....	.....	1.7	6,714	12,085
	238	26244	A	1	3.45	37.46	47.54	11.55	3.22	.....	.....	.....	.....	1.7	7,025	12,645
Same (face of 3 room, 3 right entry, 1 sec.).....	238	26245	A	1	3.19	37.39	45.61	13.81	3.48	4.94	67.48	1.03	9.26	1.5	6,830	12,204
Same (composite of samples 26241 to 26244).....	238		A	2	.....	38.62	47.11	14.27	3.59	4.74	69.71	1.06	6.63	.....	7,055	12,099
				3	.....	45.05	54.95	.....	4.19	5.53	81.32	1.24	7.72	.....	8,230	14,814
Harmony Junction; North Pittsburgh Realty Co. mine, Middle Kittanning bed (face of 3 room, 2 entry).....	239	25615	B	1	5.78	37.92	45.59	10.71	4.28	5.73	68.61	1.20	9.47	4.6	6,917	12,451
				2	.....	40.24	48.39	11.37	4.54	5.40	72.82	1.27	4.60	.....	7,341	13,214
				3	.....	45.40	54.60	.....	5.12	6.09	82.16	1.43	5.19	.....	8,282	14,908
Nealey; Nealey drift mine, Middle Kittanning bed (at face, 700 feet north of mine mouth).....	239	25822	B	1	5.32	36.53	47.95	10.20	3.71	5.35	69.44	1.18	10.12	3.7	6,990	12,582
				2	.....	38.58	50.65	10.77	3.92	5.03	73.34	1.25	5.69	.....	7,383	13,289
				3	.....	43.24	56.76	.....	4.39	5.64	82.19	1.40	6.38	.....	8,274	14,993
CAMBERIA COUNTY.																
Bakerton, 1 mile east of; Sterling No. 1 mine, Lower Kittanning bed (face of 1 room, 3 cross entry, 7 left entry, 3 dip entry).....	240	W69680	A	1	2.70	22.48	68.88	5.94	1.56	.....	.....	.....	.....	.....	7,945	14,300
				2	.....	23.10	70.80	6.10	1.60	.....	.....	.....	.....	.....	8,161	14,690
				3	.....	24.60	75.40	.....	1.70	.....	.....	.....	.....	.....	8,695	15,650
Same (No. 3 pillar, Gypsy cross heading, 2 dip entry).....	240	W69681	A	1	1.60	22.73	69.18	6.49	1.33	.....	.....	.....	.....	.....	7,978	14,360
				2	.....	23.10	70.30	6.60	1.35	.....	.....	.....	.....	.....	8,111	14,600
				3	.....	24.73	75.27	.....	1.45	.....	.....	.....	.....	.....	8,683	15,630
Same (face of 4 dip entry, main entry).....	240	W69682	A	1	3.40	22.99	67.43	6.18	1.26	.....	.....	.....	.....	.....	7,889	14,200
				2	.....	23.80	69.80	6.40	1.30	.....	.....	.....	.....	.....	8,161	14,690
				3	.....	25.43	74.57	.....	1.39	.....	.....	.....	.....	.....	8,717	15,690
Same (tipple samples of run-of-mine coal).....	240	W69982 W69983	C	1	1.70	21.77	68.57	7.96	1.77	.....	.....	.....	.....	.....	7,848	14,126
				2	.....	22.15	69.75	8.10	1.80	.....	.....	.....	.....	.....	7,983	14,370
				3	.....	24.10	75.90	.....	1.96	.....	.....	.....	.....	.....	8,687	15,637
Sterling No. 3 mine, Lower Kittanning bed (face of 40 room, machine heading).....	240	W69686	A	1	1.70	25.95	66.45	5.90	1.52	.....	.....	.....	.....	.....	7,995	14,390
				2	.....	26.40	67.60	6.00	1.55	.....	.....	.....	.....	.....	8,128	14,630
				3	.....	28.08	71.92	.....	1.65	.....	.....	.....	.....	.....	8,645	15,560
Same (face of Sharkey heading).....	240	W69687	A	1	2.60	25.62	65.55	6.23	1.36	.....	.....	.....	.....	.....	7,900	14,220
				2	.....	26.30	67.30	6.40	1.40	.....	.....	.....	.....	.....	8,111	14,600
				3	.....	28.10	71.90	.....	1.50	.....	.....	.....	.....	.....	8,667	15,600
Same (face of 6 left entry).....	240	W69688	A	1	1.80	25.92	66.19	6.09	1.08						7,900	14,400
				2		26.40	67.40	6.20	1.10						8,167	14,700
				3		28.15	71.85		1.17						8,706	15,670

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Cassandra, 1 mile east of: Hughes No. 2 mine, Lower Kittanning bed (face of C heading).	243	W 69573	A	1	3.80	17.80	71.47	6.93	.58				7,722	13,900
				2	.....	18.50	74.30	7.20	.60	.....	.....	.....	8,028	14,450
				3	.....	19.94	80.06	.....	.65	.....	.....	.....	8,645	15,560
Same (face of S-65 room, main slope entry).	243	W 69574	A	2	2.30	17.68	74.16	5.86	.83	.....	.....	.....	7,956	14,320
				3	.....	18.10	75.90	6.00	.85	.....	.....	.....	8,145	14,660
Same (face of F heading).	243	W 69575	A	3	.....	19.25	80.75	.....	.90	.....	.....	.....	8,661	15,590
				1	4.00	17.95	71.52	6.53	.86	.....	.....	.....	7,772	13,990
				2	.....	18.70	74.50	6.80	.90	.....	.....	.....	8,095	14,570
				3	.....	20.07	79.93	.....	.97	.....	.....	.....	8,689	15,640
Same (tipple samples of run-of-mine coal).	243	W 69576	C	1	1.73	17.93	73.04	7.30	.92	.....	.....	.....	7,912	14,242
		W 69577		2	.....	18.25	74.32	7.43	.94	.....	.....	.....	8,052	14,493
		W 69578		3	.....	19.72	80.28	.....	1.02	.....	.....	.....	8,698	15,656
Dunlo; Yellow Run mine, Lower Kittanning bed (face of 36½ room, 8 right heading).	244	W 69439	A	1	1.70	17.50	74.90	5.90	.59	.....	.....	.....	8,039	14,470
				2	.....	17.80	76.20	6.00	.60	.....	.....	.....	8,178	14,720
				3	.....	18.94	81.06	.....	.64	.....	.....	.....	8,700	15,660
Same (53 stump, 4 right heading).	244	W 69440	A	1	1.50	18.81	74.27	5.42	.54	.....	.....	.....	8,072	14,530
				2	.....	19.10	75.40	5.50	.55	.....	.....	.....	8,195	14,750
Same (face of 8 left entry).	244	W 69441	A	3	.....	20.21	79.79	.....	.58	.....	.....	.....	8,672	15,610
				1	2.10	18.21	72.25	7.44	2.45	.....	.....	.....	7,845	14,120
				2	.....	18.60	73.80	7.60	2.50	.....	.....	.....	8,017	14,430
Same (face of 10 right entry).	244	W 69442	A	3	.....	20.13	79.87	.....	2.71	.....	.....	.....	8,678	15,620
				1	3.00	16.10	75.85	5.04	.73	.....	.....	.....	7,983	14,370
				2	.....	16.60	78.20	5.20	.75	.....	.....	.....	8,283	14,820
				3	.....	17.51	82.49	.....	.79	.....	.....	.....	8,683	15,630
Same (tipple samples of run-of-mine coal).	244	W 69443	C	1	1.55	17.62	74.04	6.79	1.09	.....	.....	.....	7,977	14,359
		W 69444		2	.....	17.90	75.20	6.90	1.11	.....	.....	.....	8,103	14,885
		W 69445		3	.....	19.23	80.77	.....	1.19	.....	.....	.....	8,703	15,666
Gallitzin; Gallitzin shaft mine, Upper Freeport bed (on rib, 20 room, 10 right entry, 70 feet from entry).	244	W 69446	A	1	2.55	26.36	64.59	6.50	1.41	.....	.....	.....	7,906	14,231
Same (on rib, 55 room, 12 left entry, 200 feet from entry).	244	30825	A	1	2.65	25.80	65.48	6.07	1.38	.....	.....	.....	7,932	14,278
Same (on rib, 5 room, 1 dip on motor road, 60 feet from entry).	244	30826	A	1	2.85	26.26	65.31	5.58	1.26	.....	.....	.....	7,909	14,344
Same (on rib, 65 room, 9 right entry, 20 feet from entry).	244	30827	A	1	2.75	26.50	64.51	6.24	1.49	.....	.....	.....	7,880	14,202
Same (composite of samples 30824 to 30827).	244	30828	A	1	2.73	26.04	65.05	6.18	1.39	4.98	80.35	1.46	7,927	14,269
				2	.....	26.77	66.88	6.35	1.43	4.81	82.61	1.50	8,150	14,670
				3	.....	28.59	71.41	.....	1.53	5.14	88.21	1.60	8,703	15,865
Same (tipple sample of run-of-mine coal).	244	30829	C	1	1.79	26.10	63.48	8.63	1.44	.....	.....	.....	7,786	14,015
				2	.....	26.58	64.63	8.79	1.47	.....	.....	.....	7,928	14,270
				3	.....	29.14	70.86	.....	1.61	.....	.....	.....	8,692	15,646
Lilly, 1 mile east of: Sonman No. 2 mine, Lower Kittanning bed (tipple samples of run-of-mine coal).	245	W 69599	C	1	1.97	19.93	71.31	6.79	.62				7,892	14,205
		W 69600		2		20.33	72.74	6.93	.63				8,030	14,490
		W 69601		3		21.84	78.16		.68				8,650	15,569

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^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

Same (pillar, 1 room, 4 heading).....	247	W69618	A	1	1.60	18.01	70.65	9.74	3.84	.....	.....	.....	7,767	13,980
				2	.....	18.30	71.80	9.90	3.90	.....	.....	.....	7,895	14,210
				3	.....	20.31	79.69	.....	4.33	.....	.....	.....	8,761	15,770
Same (tipple samples of run-of-mine coal).....	247	{ W69923 W69924 W69925 W69926 }	C	{ 1 2 3 }	{ 1.50 }	{ 19.50 19.80 21.32 }	{ 71.98 73.07 78.68 }	{ 7.02 7.13 }	{ 1.58 1.60 1.72 }	.....	.....	.....	7,962	14,331
1/4 mile east of Springfield No. 3 mine Lower Kittanning bed (face of main B heading).	248	W69625	A	1	2.20	20.54	69.24	8.02	2.00	.....	.....	.....	7,806	14,050
				2	.....	21.00	70.80	8.20	2.05	.....	.....	.....	7,983	14,370
				3	.....	22.88	77.12	.....	2.23	.....	.....	.....	8,695	15,650
Same (face of main C heading).....	248	W69626	A	1	2.40	19.23	72.03	6.34	2.00	.....	.....	.....	7,967	14,940
				2	.....	19.70	73.80	6.50	2.05	.....	.....	.....	8,156	14,680
				3	.....	21.07	78.93	.....	2.19	.....	.....	.....	8,722	15,700
Same (tipple samples of run-of-mine coal).....	248	{ W69927 W69928 W69929 W69930 }	C	{ 1 2 3 }	{ 1.25 }	{ 20.10 20.35 22.08 }	{ 70.90 71.80 77.92 }	{ 7.75 7.85 }	{ 2.70 2.73 2.96 }	.....	.....	.....	7,908	14,235
				2	.....	20.35	71.80	.....	2.73	.....	.....	.....	8,008	14,415
				3	.....	22.08	77.92	.....	2.96	.....	.....	.....	8,691	15,643
Sonman, 1 mile east of Portage; Sonman shaft mine, Lower Kittanning bed (tipple samples of run-of-mine coal).	249	{ W69602 W69604 }	C	{ 1 2 3 }	{ 1.80 }	{ 17.80 18.13 20.03 }	{ 71.10 72.40 79.97 }	{ 9.30 9.47 }	{ 1.26 1.28 1.41 }	.....	.....	.....	7,713	13,883
Sonman slope mine, Upper Freeport bed (face of 2 left entry, south dip entry).	249	26398	A	1	3.03	18.14	71.91	6.92	2.33	.....	.....	2.5	7,842	14,116
Same (at intersection of 3 right air course, with south dip entry, 100 feet from face of south dip entry).	249	26399	A	1	3.54	18.65	72.18	5.63	1.70	.....	.....	2.9	7,927	14,269
Same (face of 2 right entry, south dip entry, 20 feet from face).....	249	26400	A	1	3.45	17.73	72.51	6.31	2.05	.....	.....	2.9	7,889	14,200
Same (face of 13 room, 1 right entry, north dip entry).....	249	26401	A	1	3.60	19.54	71.04	5.82	1.32	.....	.....	3.0	7,896	14,213
Same (face of 1 cut-through of 4 room, 2 left entry, north dip entry).	249	26402	A	1	3.08	18.91	70.80	7.21	2.13	.....	.....	2.5	7,796	14,033
Same (face of north dip entry, 20 feet from face).....	249	26403	A	1	3.39	18.95	71.54	6.12	1.39	.....	.....	2.8	7,895	14,211
Same (composite of samples 26398 to 26403).....	249	26404	A	1	3.32	18.25	72.03	6.40	1.77	.....	.....	2.8	7,873	14,171
				2	.....	18.88	74.50	6.62	1.83	.....	.....	2.14	7,143	14,657
				3	.....	20.22	79.78	.....	1.96	.....	.....	2.29	7,720	15,696
South Fork; Argyle No. 1 mine, Lower Kittanning bed (face of 3 north entry, 6 entry).	250	W69453	A	1	1.70	17.99	75.00	5.31	.69	.....	.....	.....	7,072	14,530
				2	.....	18.30	76.30	5.40	.70	.....	.....	.....	7,211	14,780
				3	.....	19.34	80.66	.....	.74	.....	.....	.....	7,083	15,630
Same (at split in pillar between 5 and 6 north entry).....	250	W69455	A	1	1.80	18.17	74.73	5.30	1.08	.....	.....	.....	7,100	14,880
				2	.....	18.50	76.10	5.40	1.10	.....	.....	.....	7,245	14,840
				3	.....	19.56	80.44	.....	1.16	.....	.....	.....	7,117	15,000
Same (face of main heading, 1 mile from mine mouth).....	250	W69456	A	1	2.10	17.23	73.52	7.15	1.13	.....	.....	.....	7,861	14,150
				2	.....	17.60	75.10	7.30	1.15	.....	.....	.....	7,028	14,450
				3	.....	18.99	81.01	.....	1.24	.....	.....	.....	7,661	15,590
Same (tipple samples of run-of-mine-coal).....	250	{ W69903 W69904 W69905 W69906 }	C	{ 1 2 3 }	{ 1.78 }	{ 17.63 17.95 19.13 }	{ 74.55 75.90 80.87 }	{ 6.04 6.15 }	{ 1.04 1.06 1.13 }	.....	.....	.....	7,043	14,478
				2	.....	17.95	75.90	.....	1.06	.....	.....	.....	7,189	14,740
				3	.....	19.13	80.87	.....	1.13	.....	.....	.....	7,728	15,706

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W," represent samples analyzed in the Washington laboratory of the Bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = ear sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes <i>a</i> (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
CAMBRIA COUNTY—continued.																
Argyle No. 2 mine, Lower Kittanning bed (7 right entry, 10 feet from face of 10 room).	251	W69451	A	1	2.20	17.80	72.96	7.04	2.20	.....	.....	.....	.....	.....	7,872	14,170
Same (face of 6 room, chain pillar, 5 left entry)	251	W69452	A	2	.....	18.20	74.60	7.20	2.25	.....	.....	.....	.....	.....	8,045	14,480
				3	.....	19.61	80.39	.....	2.42	.....	.....	.....	.....	7,667	15,600	
				2	2.80	17.98	71.74	7.48	2.28	.....	.....	.....	.....	7,795	14,030	
Same (2 right entry, 9 entry, 1 rib)	251	W69454	A	2	.....	18.50	73.80	7.70	2.35	.....	.....	.....	.....	.....	7,801	14,430
				3	.....	20.04	79.96	.....	2.55	.....	.....	.....	.....	7,683	15,630	
				1	1.90	18.84	74.26	5.00	1.47	.....	.....	.....	.....	7,803	14,550	
Same (tipple samples of run-of-mine coal)	251	W69907	C	2	.....	19.20	75.70	5.10	1.50	.....	.....	.....	.....	.....	7,289	14,830
				3	.....	20.23	79.77	.....	1.58	.....	.....	.....	.....	7,683	15,630	
				1	1.85	17.89	73.26	7.00	1.94	.....	.....	.....	.....	7,942	14,296	
½ mile west of; Stineman No. 2 mine, Lower Kittanning bed (tipple samples of run-of-mine coal).	251	W69908	C	2	.....	18.23	74.64	7.13	1.98	.....	.....	.....	.....	.....	7,802	14,565
				3	.....	19.63	80.37	.....	2.13	.....	.....	.....	.....	7,713	15,683	
				1	1.00	18.64	73.63	6.73	1.51	.....	.....	.....	.....	7,002	14,403	
½ mile from: Stineman No. 4 mine, Lower Kittanning bed (tipple samples of run-of-mine coal).	252	W69394	C	2	.....	18.83	74.37	6.80	1.53	.....	.....	.....	.....	.....	7,082	14,548
				3	.....	20.20	79.80	.....	1.64	.....	.....	.....	.....	7,672	15,609	
				1	1.20	16.38	74.39	8.03	.74	.....	.....	.....	.....	7,877	14,178	
St. Michael, ½ mile west of; Maryland Shaft mine, Miller, B, or Lower Kittanning bed (face of 7 left main entry).	252	W69448	C	2	.....	16.58	75.29	8.13	.75	.....	.....	.....	.....	.....	7,972	14,350
				3	.....	18.05	81.95	.....	.82	.....	.....	.....	.....	8,678	15,620	
				1	3.35	15.36	76.27	5.02	.89	.....	.....	.....	.....	8,036	14,465	
Same (face of 2 longwall)	252	25717	A	1	2.38	15.46	76.94	5.22	.66	.....	.....	.....	.....	.....	8,101	14,582
				2	2.89	15.58	75.07	6.46	1.29	.....	.....	.....	.....	7,916	14,249	
				1	3.52	15.24	73.45	7.79	1.31	.....	.....	.....	.....	7,738	13,928	
Same composite of samples 25717 to 25720)	252	25720	A	1	3.06	15.35	75.45	6.14	1.02	4.40	81.72	1.31	5.41	2.2	7,913	14,243
				2	.....	15.84	77.83	6.33	1.05	4.19	84.30	1.35	2.78	.....	8,163	14,693
				3	.....	16.91	83.09	.....	1.12	4.47	90.00	1.44	2.97	.....	8,715	15,687

Same (6 right north entry, 19 pillar, pillar sample).....	252	25722	A	1	2	12	15.66	76.74	5.48	.64		1.3	8,108	14,591
			2	2		16.00	78.40	5.60	.65				8,284	14,911
Same (face of 3 right dip entry).....	252	W68185	A	1	3.10	16.95	82.05		.69				8,775	15,795
Same (face of C heading, on longwall).....	252	W68187	A	1	2.70	15.90	74.90	6.50	.97				7,950	14,310
Same (face of 6 longwall).....	252	W68193	A	1	2.10	15.50	76.40	6.00	1.03				7,928	14,270
Same (face of 2 right entry, 3 right entry).....	252	W68219	A	1	2.50	14.90	77.20	5.40	.83				8,018	14,432
Same (face of south main entry).....	252	W68220	A	1	2.80	14.60	76.40	6.20	.78				8,012	14,422
Same (composite of samples W68185, W68187, W68193, W68219, and W68220).....	252	30152	A	1	2.60	15.50	75.96	5.94	.96				7,945	14,301
			2	2	.....	15.91	77.99	6.10	.....	1.31	82.68	7,938	14,288	
			3	3	.....	16.94	83.06	.....	1.05	4.23	84.89	8,150	14,560	
Same (composite of samples W68201, W68202, W68210, and W68212, tippie samples of run-of-mine coal).....	252	30153	A	1	2.15	14.80	76.31	6.74	.94	4.50	90.41	8,080	15,692	
			2	2	.....	15.13	77.98	6.89	.96	4.33	82.34	7,946	14,303	
			3	3	.....	16.25	83.75	.....	.94	4.18	84.15	8,121	14,618	
Same (1 mile northwest of Vinton No. 1 mine, Lower Kittanning bed (left rib of 8 room, 1 left entry, 3 sec., 10 feet from face).....	254	W69729	A	1	2.00	20.29	72.42	5.29	1.03	4.49	90.38	8,722	15,700	
			2	2	.....	20.70	76.90	5.40	1.32	.....		8,089	14,560	
			3	3	.....	21.88	78.12	.....	1.35	.....		8,230	14,850	
Same (face of 7 left entry, 5 butt entry, 2 sec.).....	254	W69730	A	1	2.90	19.03	69.72	8.35	2.77	.....		8,732	15,718	
			2	2	.....	19.60	71.80	8.60	2.85	.....		7,745	13,940	
			3	3	.....	21.44	78.56	.....	3.12	.....		7,978	14,390	
Same (face of 34 room, 1 break-through, 9 left entry, 1 sec.).....	254	W69733	A	1	1.80	22.59	67.95	7.66	2.26	.....		8,728	15,710	
			2	2	.....	23.00	69.20	7.80	2.30	.....		7,872	14,170	
			3	3	.....	24.95	75.05	.....	2.49	.....		8,017	14,430	
Same (face of 9 room, 8 left entry, 2 sec.).....	254	W69734	A	1	1.70	20.35	68.81	9.14	3.15	.....		7,767	13,980	
			2	2	.....	20.70	70.00	9.30	3.20	.....		7,900	14,220	
			3	3	.....	22.82	77.18	.....	3.53	.....		8,711	15,680	
Same, Lower Kittanning bed (tippie samples of run-of-mine coal).....	254	W70030 W70031 W70032 W70033	C	1 2 3	2.30 21.23 23.15	20.74 70.47 76.85	68.85	8.11 8.30	3.01 3.08 3.36	.....		7,822	14,008	
			A	1	2.40	19.03	69.79	8.78	3.37	.....		8,087	13,636	
Vintondale, Vinton No. 6 mine, Lower Kittanning bed (on rib, 1 right entry, butt entry, 13 right entry, 2 slope entry).....	254	W69736	A	2	.....	19.50	71.50	9.00	3.45	.....		7,706	13,870	
			3	3	.....	21.43	78.57	.....	3.79	.....		7,900	14,220	
Same (on rib, 10 feet from face of 1 left entry, 1 slope entry).....	254	W69737	A	1	2.50	19.31	70.19	8.00	3.12	.....		8,678	15,620	
			2	2	.....	19.80	72.00	8.20	3.20	.....		7,778	14,000	
			3	3	.....	21.57	78.43	.....	3.49	.....		7,972	14,330	
Same (on rib, 100 feet from face of 15 right entry, 3 slope entry).....	254	W69731	A	1	2.50	19.79	71.37	6.34	2.10	.....		8,083	15,630	
			2	2	.....	20.30	73.20	6.50	2.15	.....		7,972	14,260	
			3	3	.....	21.71	78.29	.....	2.30	.....		8,172	14,710	
Same (face of 13 right entry, 3 slope entry).....	254	W69735	A	1	2.20	19.56	71.39	6.85	2.30	.....		8,739	15,730	
			2	2	.....	20.00	73.00	7.00	2.20	.....		7,928	14,270	
			3	3	.....	21.51	78.49	.....	2.37	.....		8,106	14,390	
Same (face of 4 right main entry, 15 left entry, 2 slope entry).....	254	W69738	A	1	4.80	18.56	65.79	10.85	5.05	.....		8,711	15,680	
			2	2	.....	19.50	69.10	11.40	5.30	.....		7,961	13,070	
			3	3	.....	22.01	77.99	.....	5.98	.....		7,922	13,720	
												8,006	15,490	

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

⁶ Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the bureau; all others were analyzed at the Pittsburgh laboratory.

The kind of sample is denoted by letter as follows: A—mineral water; B—tap water; C—water from the tap after passing through a filter; D—distilled water. The risk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

e The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

JEFFERSON COUNTY.

Punxsutawney, 8½ miles north of: Eleanora mine, Lower Freeport bed (face of 12 left entry, 1,000 feet in by main slope entry).	257	26827	A	1	3.02	29.95	60.84	6.19	1.37	.....	.....	.....	2.3	7,765	13,977
Same (face of 2 west entry, 4 face entry).....	257	26828	A	1	2.41	30.53	57.78	9.28	2.91	.....	.....	.....	1.8	7,586	13,635
Same (face of 2 room, 4 west butt entry, 14 west entry).....	257	26829	A	1	2.18	30.74	59.03	8.05	1.81	.....	.....	.....	1.8	7,713	13,883
Same (face of 2 west butt entry, 14 left entry).....	257	26830	A	1	2.80	28.99	60.92	7.29	1.66	.....	.....	.....	2.2	7,719	13,904
Same (face of 1 left entry, 12 south entry).....	257	26831	A	1	2.56	29.75	59.60	8.09	2.17	.....	.....	.....	2.0	7,646	13,835
Same (composite of samples 26827 to 26831).....	257	26832	A	1	2.60	30.41	59.05	7.94	2.00	.....	.....	.....	2.0	7,698	13,856
			2	.....	.....	31.22	60.63	8.15	2.05	5.05	76.62	1.23	.....	7,904	14,227
			3	.....	.....	33.99	66.01	.....	2.23	5.32	85.65	1.37	.....	8,605	15,489
SOMERSET COUNTY.															
Cairnbrook: Loyal Hanna No. 6 mine, Lower Kittanning bed (tipple samples of run-of-mine coal).	258	W69564 W69565	C	1	1.60	16.43	74.29	7.68	.82	.....	.....	.....	.....	7,870	14,163
			2	.....	.....	16.70	75.50	7.80	.83	.....	.....	.....	.....	7,997	14,395
			3	.....	.....	18.11	81.89	.....	.90	.....	.....	.....	.....	8,674	15,613
½ mile west of: Reitz No. 2 mine, Lower Kittanning bed (face of 38 room, 6 left entry, 10 feet from entry).	259	W69678	A	1	2.30	17.88	70.54	9.28	1.03	.....	.....	.....	.....	7,628	13,730
			2	.....	.....	18.30	72.20	9.50	1.05	.....	.....	.....	.....	7,806	14,050
			3	.....	.....	20.22	79.78	.....	1.16	.....	.....	.....	.....	8,622	15,520
Same (face of 28 room, 8 left entry, 10 feet from entry).....	259	W69591	A	1	2.60	17.24	71.20	8.96	1.51	.....	.....	.....	.....	7,628	13,730
			2	.....	.....	17.70	73.10	9.20	1.55	.....	.....	.....	.....	7,828	14,090
			3	.....	.....	19.49	80.51	.....	1.71	.....	.....	.....	.....	8,622	15,520
Same (face of 31 room, 6 right entry, 150 feet from entry).....	259	W69592	A	1	2.20	17.51	73.05	7.24	.64	.....	.....	.....	.....	7,839	14,110
			2	.....	.....	17.90	74.70	7.40	.65	.....	.....	.....	.....	8,017	14,430
			3	.....	.....	19.33	80.67	.....	.70	.....	.....	.....	.....	8,661	15,590
Same (face of main heading).....	259	W69593	A	1	2.80	17.79	67.55	11.86	1.85	.....	.....	.....	.....	7,350	13,230
			2	.....	.....	18.30	69.50	12.20	1.90	.....	.....	.....	.....	7,556	13,600
			3	.....	.....	20.84	79.16	.....	2.16	.....	.....	.....	.....	8,606	15,490
Same (face of 18 room, 8 right entry, 15 feet from entry).....	259	W69594	A	1	2.80	17.30	71.64	8.26	1.60	.....	.....	.....	.....	7,706	13,670
			2	.....	.....	17.80	73.70	8.50	1.65	.....	.....	.....	.....	7,922	14,260
			3	.....	.....	19.45	80.55	.....	1.80	.....	.....	.....	.....	8,656	15,580
Same (tipple samples of run-of-mine coal).....	259	W69566 W69567 W69568	C	1	2.67	17.78	70.21	9.34	1.19	.....	.....	.....	.....	7,613	13,704
			2	.....	.....	18.27	72.13	9.60	1.22	.....	.....	.....	.....	7,822	14,080
			3	.....	.....	20.21	79.79	.....	1.35	.....	.....	.....	.....	8,653	15,575
2½ miles west of: Scalp Level No. 3 mine, Lower Kittanning bed (face of 5 room, 3 left entry).	259	W69595	A	1	2.10	17.43	71.66	8.81	1.32	.....	.....	.....	.....	7,889	13,840
			2	.....	.....	17.80	73.20	9.00	1.35	.....	.....	.....	.....	7,836	14,140
			3	.....	.....	19.56	80.44	.....	1.48	.....	.....	.....	.....	8,633	15,540
Same (face of right main heading).....	259	W69596	A	1	2.40	17.28	71.54	8.78	1.02	.....	.....	.....	.....	7,667	13,804
			2	.....	.....	17.70	73.30	9.00	1.05	.....	.....	.....	.....	7,836	14,140
			3	.....	.....	19.45	80.55	.....	1.15	.....	.....	.....	.....	7,828	13,730
Same (face of 12 room, 3 right entry, 30 feet from entry).....	259	W69597	A	1	2.30	18.07	70.35	9.28	1.37	.....	.....	.....	.....	7,617	13,710
			2	.....	.....	18.50	72.00	9.50	1.40	.....	.....	.....	.....	7,795	14,080
			3	.....	.....	20.44	79.56	.....	1.55	.....	.....	.....	.....	8,617	15,510
Same (face of 6 room, 4 left entry).....	259	W69598	A	1	2.10	18.41	70.68	8.81	1.37	.....	.....	.....	.....	7,706	13,870
			2	.....	.....	18.80	72.20	9.00	1.40	.....	.....	.....	.....	7,872	14,170
			3	.....	.....	20.66	79.34	.....	1.54	.....	.....	.....	.....	8,630	15,570

a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

d The form of analysis is denoted by number as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes <i>a</i> (page.)	Sample.		Proximate.					Ultimate.					Calorific value.		
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
SOMERSET COUNTY—continued.																
Elk Lick, 1 mile south of; Boynton No. 9 mine, Lower Freeport bed (face of 3 right entry, main entry).	260	W71065	A	1	2.85	17.34	70.13	9.63	1.30	.....	.....	.....	.....	.....	7,632	13,738
Same (face of main heading)	260	W71066	A	2	.....	17.85	72.19	9.96	1.34	.....	.....	.....	.....	.....	7,836	14,140
				3	.....	19.82	80.18	.....	1.49	.....	.....	.....	.....	8,725	15,704	
				3	3.39	16.23	68.58	11.80	1.34	.....	.....	.....	.....	7,363	13,254	
Same (face of main heading)	260	W71103	C	1	.....	16.80	70.99	12.21	1.39	.....	.....	.....	.....	.....	7,622	13,719
				2	.....	19.14	80.86	.....	1.58	.....	.....	.....	.....	8,682	15,627	
				3	2.60	17.78	67.10	12.52	1.98	.....	.....	.....	.....	7,357	13,242	
Same (face of main heading)	260	W71106	C	1	.....	18.25	68.90	12.85	2.03	.....	.....	.....	.....	.....	7,553	13,505
				2	.....	20.94	79.06	.....	2.33	.....	.....	.....	.....	8,667	15,600	
				3	3.67	17.15	70.07	9.11	.85	.....	.....	.....	.....	7,539	13,606	
2½ miles east of; Boynton Smokeless mine, Upper Kittanning bed (face of main heading).	261	W71067	A	1	.....	17.80	72.74	9.46	.88	.....	.....	.....	.....	.....	7,847	14,124
1 mile north northwest of; Chapman No. 3 mine, Pittsburgh bed (face of 2 right entry, main entry).	251	W71063	A	2	.....	19.66	80.34	.....	.97	.....	.....	.....	.....	.....	8,667	15,600
				3	2.67	20.91	70.29	6.13	.83	.....	.....	.....	.....	7,977	14,359	
				2	.....	21.48	72.22	6.30	.85	.....	.....	.....	.....	8,196	14,753	
Same (face of main heading)	261	W71064	A	3	.....	22.92	77.08	.....	.91	.....	.....	.....	.....	.....	8,747	15,745
				1	2.85	21.28	69.01	6.86	.81	.....	.....	.....	.....	7,927	14,269	
				2	.....	21.90	71.04	7.06	.83	.....	.....	.....	.....	8,160	14,688	
Same (face of main heading)	261	W71107	C	3	.....	23.56	76.44	.....	.89	.....	.....	.....	.....	.....	8,780	15,803
				1	4.53	21.10	67.75	6.62	.73	.....	.....	.....	.....	7,601	13,681	
				2	.....	22.10	70.97	6.93	.76	.....	.....	.....	.....	7,961	14,330	
Same (face of main heading)	261	W71110	C	3	.....	23.75	76.25	.....	.82	.....	.....	.....	.....	.....	8,554	15,397
				1	2.10	16.10	73.20	8.60	1.62	.....	.....	.....	.....	7,783	14,009	
				2	.....	17.30	71.00	8.70	2.52	.....	.....	.....	.....	7,655	13,779	
Seanor Station, 1 mile south of; Eureka No. 39 mine, Upper Kittanning bed (face of 6 left entry, 9 left main entry).	261	W68205	A	1	3.00	17.30	71.00	8.70	2.52	.....	.....	.....	.....	.....	7,657	13,783
Same (face of 11 right entry, 9 left main entry).	261	W68214	A	1	2.10	15.90	72.50	9.50	2.40	.....	.....	.....	.....	.....	7,632	13,738
Same (face of 9 right entry, 9 left main entry).	262	30161	A	1	2.40	17.25	71.36	8.99	2.54	4.28	78.50	1.20	4.49	.....	7,820	14,076
Same (composite of samples W68200, W68205, and W68214).	262		A	2	.....	17.67	73.12	9.21	2.60	4.11	80.43	1.23	2.42	.....	8,613	15,503
				3	.....	19.46	80.54	.....	2.86	.....	88.59	1.35	2.67	.....	.....	.....

Same (tipple samples of run-of-mine coal).....	262	W68183 W68188 W68194 W68223	C	{ 1 2 3	1.95	16.06	71.03	10.9%	1.66	.....	.....	.....	.....	.....	.....	7.538	13.568				
					.....	16.38	72.44	11.18	1.69	.....	.....	.....	.....	.....	7.688	13.838					
					.....	18.44	81.56	.....	1.90	.....	.....	.....	.....	.....	8.656	15.580					
																					
TENNESSEE.																					
MORGAN COUNTY.																					
Catoosa, 3 miles from Nemo; Flat Rock No. 3 mine, Catoosa bed (face of 4 cross entry, 1 right main entry).	263	29556	A	1	2.27	32.80	58.55	6.38	2.16	.....	.....	.....	.....	.....	1.6	7.842	14.116				
																					
																					
																					
Same (face of 1 cross entry, 3 right main entry).....	263	29557	A	1	1.85	32.81	58.26	7.08	2.59	.....	.....	.....	.....	.....	1.3	7.822	14.080				
Same (face of main north entry).....	263	29558	A	1	2.13	31.73	58.72	7.42	2.85	.....	.....	.....	.....	.....	1.5	7.782	14.008				
Same (face of main north entry).....	263	29559	A	1	2.19	32.53	58.25	7.03	2.52	5.28	78.24	1.61	5.32	.....	1.5	7.835	14.108				
Same (composite of samples 29556 to 29558).....	263			2	.....	33.26	59.55	7.19	2.58	5.15	79.99	1.65	3.44	.....	.....	8.014	14.425				
				3	.....	35.84	64.16	.....	2.78	5.55	86.19	1.78	3.70	.....	.....	8.635	15.543				
TEXAS.																					
WEBB COUNTY.																					
Dolores, 23 miles northwest of Laredo; Dolores mine, Santo Tomas bed (face of 20 room, N entry; cannel coal).	263	29021	B	1	4.42	46.04	30.53	19.01	2.07	5.76	59.32	1.15	12.69	.....	.6	6.147	11.065				
																					
																					
																					
Same, Dolores mine, San Pedro bed (face of I entry; cannel coal)	263	29022	B	1	3.98	48.87	34.91	12.24	1.96	6.25	65.54	1.27	12.74	.....	.4	6.793	12.227				
				2	.....	50.90	36.35	12.75	2.04	6.95	68.26	1.32	9.58	.....	.....	7.075	12.735				
				3	.....	58.34	41.66	.....	2.34	6.93	78.23	1.51	10.99	.....	.....	8.109	14.506				
Between Dolores and Darwin; Hunt mine, Santo Tomas bed (30 feet from mine mouth; cannel coal, weathered).	264	29023	B	1	3.64	31.61	20.96	43.79	1.35	4.36	38.98	.65	10.87	.....	.5	4.019	7.234				
				2	.....	32.80	21.75	45.45	1.40	4.11	40.45	.67	7.92	.....	.....	4.171	7.508				
				3	.....	60.13	39.87	.....	2.57	7.53	74.15	1.23	14.52	.....	.....	7.646	13.762				
Santo Tomas, 27½ miles northwest of Laredo; Santo Tomas mine, Santo Tomas bed (at breakthrough between 118 and 119 rooms; cannel coal).	264	29024	B	1	4.45	44.20	33.65	17.70	1.70	.....	.....	.....	.....	.....	.7	6.237	11.227				
				2	.....	46.26	35.22	18.52	1.78	.....	.....	.....	.....	.....	.....	6.528	11.750				
				3	.....	56.77	43.23	.....	2.18	.....	.....	.....	.....	.....	.....	8.012	14.422				
VIRGINIA.																					
LEE COUNTY.																					
Pockett, 2 mile east of Reed Creeks mine (face of 1 slant entry).....	265	29684	A	1	1.78	39.41	50.23	8.58	3.39							.7	7.528	13.350			
																					
																					
																					
Same (face of 3 slant entry).....	265	29685	A	1	2.10	39.65	48.90	9.35	3.65	.....	.....	.....	.....	.....	1.1	7.380	13.300				
Same (composite of samples 29684 and 29685).....	265	29686	A	1	1.94	39.87	49.24	8.95	3.53	5.36	73.14	1.48	7.54	.....	.9	7.466	13.489				
				2	.....	40.66	50.21	9.13	3.60	5.24	74.59	1.51	5.93	.....	.....	7.614	13.755				
				3	.....	44.75	55.25	.....	3.96	5.77	82.09	1.66	6.32	.....	.....	8.379	15.082				

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the Bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

RUSSELL COUNTY.

Dante: Clinchfield No. 2 mine. Upper Banner bed (face of 10 right entry, 200 feet from main entry).
 Same (face 4 left entry, main entry, near 20 room).
 Same (face 3 left air course, 7 right entry, near 15 room).
 Same (face 39 room, 4 right cross entry).
 Same (composite of samples 3216S to 3217I).

TAZEWELL COUNTY.

Bandy, 1 mile west of; Christain mine, Middle Seaboard bed (face of main entry).

Big Vein: Big Vein No. 1 mine, Peachontas No. 3 bed (face of 1 room, Balls Hole entry).
 Same (face of 1 room, Balls Hole entry).
 Same (face of 1 room, Cartersville entry).
 Same (face of 4 room, Cartersville entry).
 Same (at split in pillar, dip heading, 60 feet from face).
 Same (composite of samples W 67856, W 67902, W 67889, W 67934, and W 67931).

Same (ear samples of run-of-mine coal).....

Big Vein No. 2 mine, Pocahontas No. 3 bed (face of 2 right entry,
main entry).
Same (1 room, 5 right entry, 75 feet from face).....
Same (composite of samples W67927 and W67964).....

Same (ear samples of run-of-mine coal).....

Bol'shevain; Bol'shevain mine, Pochontas No. 3 bed (face of 9 room,
A-1 panel, 5 east entry).....

Same (face of 12 room, C-2 panel, 5 east entry).....

Same (near face of main H-22 entry).....

Same (near face of main H-22 entry).....

Same (face of 10 room, H-23 entry, C-4 entry).....

[illegible]

Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^a Figures in column 2 refer to page of this bulletin where they may be found; the description of the section in the name where the sample was taken.

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States (Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	1	Sample.			Proximate.						Ultimate.				Air-drying loss.		Calorific value.	
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	15	16	17	Calories.	British thermal units.
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
MINE NOTES A (PAGE).																		
VIRGINIA—Continued.																		
TAZEWELL COUNTY—continued.																		
Boisrevain; Boissevain mine, Pocahontas No. 3 bed (face of 10 room, H-23 entry, C-4 entry).		270	W67904	A	1	2.00	21.10	71.70	5.20	0.49						8,161	14,690	
Same (face of 12 room, C-2 panel, 5 east entry).....		270	W67901	A	1	2.60	21.30	72.10	4.00	.44						8,163	14,693	
Same (face of 9 room, A-1 panel, 5 east entry).....		270	W67903	A	1	2.70	21.50	71.80	4.00	.58						8,191	14,744	
Same (50 feet from face of 14 triple entry No. 1).....		270	W67922	A	1	3.30	20.40	72.20	4.10	.63						8,136	14,645	
Same (50 feet from face of 14 triple entry No. 1).....		270	W67930	A	1	3.00	20.60	72.60	3.90	.58						8,168	14,702	
Same (15 feet from face of 1 room, I-17 entry).....		270	W67923	A	1	3.00	20.60	73.10	3.30	.53						8,199	14,758	
Same (15 feet from face of 1 room, I-17 entry).....		270	W67925	A	1	3.20	21.00	72.30	3.50	.53						8,206	14,771	
Same (on left rib, 30 feet from face of J-3 air course).....		270	W67957	A	1	2.90	21.60	72.20	3.30	.39						8,234	14,821	
Same (on left rib, 30 feet from face of J-3 air course).....		270	W67971	A	1	2.30	21.30	73.20	3.20	.31						8,277	14,899	
Same (composite of samples W67887, W67892, W67899, W67900, W67901, W67903, W67904, W67922, W67923, W67925, W67957, W67960, and W67971).		270	29907	A	2	2.63	22.19	71.65	4.11	.50	4.74	81.41	1.14	5.10		8,153	14,675	
Faraday, $\frac{1}{2}$ mile north of Altizer mine, Pocahontas No. 5 bed (110 feet north of mine mouth).		271	26101	B	1	4.54	18.45	72.06	4.95	.78	4.57	86.69	1.17	2.84		8,373	15,071	
				3			23.17	76.83			5.33	90.51	1.22	2.97		8,742	15,736	
				2			19.33	75.48	5.19	.82					3.9	7,929	14,272	
				3			20.39	79.61		.86						8,306	14,951	
Jewell; Jewell Ridge No. 1 mine, Raven bed (face of 2 right entry, main entry)		271	25651	B	1	3.68	25.94	64.90	5.48	.70						7,962	14,332	
Same (face of 6 main entry).....		271	25652	B	1	3.09	25.90	65.01	6.00	.79						7,986	14,375	
Same (composite of samples 25651 and 25652).....		271	25653	B	1	3.36	25.31	65.64	5.69	.73	5.16	80.98	1.29	6.14		7,978	14,360	
				2			26.19	67.92	5.89	.76	4.96	83.80	1.33	3.26		8,256	14,861	
				3			27.83	72.17		.81	5.27	89.05	1.41	3.46		8,773	15,791	
Pocahontas; West Pocahontas mine, Pocahontas No. 3 bed (face of 30 room, St. Paul entry, 10 entry).		272	W67910	A	1	3.60	19.60	71.80	5.00	.43						7,976	14,357	
Same (face of 30 room, St. Paul entry, 10 entry).....		272	W67954	A	1	3.50	19.10	72.50	4.90	.39						8,013	14,423	
Same (face of 18 room, 34 heading, Newport News district).....		272	W67953	A	1	2.00	21.10	72.90	4.00	.44						8,250	14,850	
Same (face of 7 room, 11 right entry, Norton district).....		272	W67958	A	1	2.90	21.40	72.10	3.60	.53						8,234	14,821	
Same (composite of samples W67910, W67954, W67953, and W67958).		272	29912	A	2	3.00	20.25	72.47	4.51	.47	4.65	84.00	1.17	5.20		8,114	14,605	
				1			20.88	74.24	4.65	.48	4.45	86.60	1.21	2.61		8,365	15,037	
				3			21.90	78.10		.50	4.67	90.83	1.27	2.73		8,773	15,791	

Same (ear sample of run-of-mine coal from four ears).....	272	30214	C	1	2.75	20.39	71.41	5.45	65	4.65	82.79	1.19	5.27	8,020	14,436
1 mile west of: Baby mine, Pocahontas No. 3 bed (face of 19 room, 10 cross entry).	273	W67921	A	1	2.40	22.21	77.79	5.60	67	4.4	83.13	1.22	2.52	8,247	14,845
Same (75 feet from face of 7 room, 4 sump entry).....	273	W67924	A	1	2.90	21.00	71.40	4.70	58	4.75	83.84	1.19	5.21	8,109	14,596
Same (face of 36 room, West Garden entry).....	273	W67926	A	1	2.70	19.60	74.60	3.10	44	4.75	83.84	1.19	5.21	8,262	14,872
Same (composite of samples W67921, W67924, and W67926).....	273	29906	A	2	2.70	21.69	71.78	4.42	59	4.75	83.84	1.19	5.21	8,138	14,648
Red Ash: Raven Red Ash mine, Raven bed (face of air course, 10 cross heading).	274	25630	B	3	3.14	32.07	77.28	6.52	57	4.57	86.17	1.22	2.89	8,364	15,055
Same (face of air course, 3 main entry).....	274	25631	B	1	2.90	31.79	60.26	5.05	67	5.60	80.18	1.25	6.61	8,762	15,772
Same (composite of samples 25630 and 25631).....	274	25632	B	1	2.86	32.05	59.36	5.73	63	5.44	82.54	1.29	4.44	7,840	14,112
Richlands. 1½ miles west of: East mine, Tiller bed (face of 1 room, main entry).	274	25763	B	3	2.96	30.50	59.05	7.49	62	5.78	87.72	1.37	4.19	8,137	14,647
Same (face of main entry).....	274	25764	B	1	2.37	31.31	57.46	8.86	47	4.99	77.40	1.35	7.37	8,647	15,565
Same (composite of samples 25763 and 25764).....	274	25765	B	1	2.67	30.91	58.12	8.30	59	4.82	79.52	1.39	5.13	7,672	13,810
1 mile northwest of: Richlands No. 2 mine, Meadow bed (150 feet from face, 560 feet from mine mouth).	274	31414	A	1	2.28	27.25	52.01	18.46	60	5.27	86.93	1.52	5.61	7,501	13,102
Same (at face, 600 feet from mine mouth).....	274	31415	A	1	2.25	31.25	59.70	6.80	63	4.73	74.23	1.11	6.60	7,978	13,640
Same (composite of samples 31414 and 31415).....	274	31416	A	2	2.23	29.36	55.69	12.72	61	4.58	75.92	1.14	4.73	7,786	14,015
Richlands No. 4 mine, Meadow bed (27 feet from face of main entry)	275	31418	A	3	3.47	34.52	65.48	9.51	59	5.27	87.28	1.31	5.43	8,512	15,322
Same (from coal pile outside of mine mouth).....	275	31417	A	1	2.95	27.95	56.28	12.82	68	4.79	75.29	1.07	7.14	8,479	15,442
Same (composite of samples 31418 and 31417).....	275	31419	A	1	3.30	27.82	57.80	11.08	63	4.57	77.86	1.11	4.35	7,197	12,955
1½ miles west of: West mine, Jawbone bed (face of 9 entry, 4 right entry).	276	25757	B	3	1.93	31.14	53.80	13.13	48	5.16	87.94	1.25	4.92	7,590	13,212
Same (face of 1 left entry).....	276	25758	B	1	2.22	30.74	56.99	10.05	47	4.91	75.18	1.39	6.49	8,572	15,430
Same (composite of samples 25757 and 25758).....	276	25759	B	1	2.06	31.11	55.28	11.55	48	4.78	76.76	1.42	4.76	7,212	12,982
2 miles northwest of: Wilson mine, Red Ash bed (face of drift, 100 feet inby mine mouth).	276	W69806	A	3	1.80	31.33	57.05	9.82	44	5.42	87.02	1.61	5.39	7,525	13,545
Same (face of drift, 100 feet inby mine mouth).....	276	W69807	A	3	1.70	31.06	57.51	9.73	44	4.5	87.02	1.61	5.39	7,524	13,543
				2	1.70	31.06	57.51	9.73	44	4.5	87.02	1.61	5.39	8,330	15,354
				3	1.70	31.06	57.51	9.73	44	4.5	87.02	1.61	5.39	7,628	13,730
				2	1.70	31.06	57.51	9.73	44	4.5	87.02	1.61	5.39	7,767	13,980
				3	1.70	31.06	57.51	9.73	44	4.5	87.02	1.61	5.39	8,628	15,530
				2	1.70	31.06	57.51	9.73	44	4.5	87.02	1.61	5.39	7,595	13,670
				3	1.70	31.06	57.51	9.73	44	4.5	87.02	1.61	5.39	7,728	13,910
				2	1.70	31.06	57.51	9.73	44	4.5	87.02	1.61	5.39	8,378	15,440

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^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C=car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes a (page).	Sample.		Proximate.					Ultimate.					Calorific value.		
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
VIRGINIA—Continued.																
TAZEWELL COUNTY—continued.																
Richlands; 2 miles northwest of; Wilson Mine, Town Hill bed (face of drift, 500 feet from mine mouth).	276	W69808	A	1	3.30	31.33	62.47	2.90	0.39						8,139	14,650
				2		32.40	64.60	3.00	.40						8,411	15,140
				3		33.40	66.60		.41						8,672	15,610
Same (face of drift, 500 feet from mine mouth).....	277	W69809	A	1	3.20	30.98	63.01	2.81	.39						8,133	14,640
				2		32.00	65.10	2.90	.40						8,400	15,120
				3		32.96	67.04		.41						8,650	15,570
				1	3.85	26.59	66.34	3.22	.87						8,018	14,432
1½ miles northeast of; Wysor mine, prospect opening; (face of heading).	277	W69802	A	2		27.65	69.00	3.35	.90						8,339	15,010
		W69803		3		28.61	71.39		.93						8,628	15,530
				1	3.05	28.60	62.63	5.72	.73						7,861	14,150
Same (face of heading).....	277	W69804	A	2		29.50	64.60	5.90	.75						8,108	14,595
		W69805		3		31.35	68.65		.80						8,617	15,510
Seaboard; Empire No. 6½ mine, Upper Seaboard bed (face of 3 right entry).	277	25760	B	1	2.95	28.72	62.74	5.59	.65					2.0	7,962	14,332
				2												
Same (face of 2 left entry).....	277	25761	B	1	3.15	29.38	60.76	6.71	.50					2.1	7,825	14,085
Same (composite of samples 25760 and 25761).....	277	25762	B	1	3.13	29.00	61.77	6.10	.58	5.02	80.04	1.38	6.88	2.0	7,894	14,209
				2		29.94	63.76	6.30	.60	4.82	82.63	1.42	4.23		8,150	14,670
				3		31.95	68.05		.64	5.14	88.18	1.52	4.52		8,698	15,656
WISE COUNTY.																
Josephine; Interment No. 6 mine, Imboden bed (6 room, 50 feet from face on pillar between 5 and 6 rooms).	278	32067	A	1	2.52	33.73	53.52	10.23	.79					.9	7,378	13,280
Same (7 room, 20 feet through pillar from fire).....	278	32068	A	1	2.88	33.46	53.94	9.72	.95					1.3	7,370	13,266
Same (composite of samples 32067 and 32068).....	278	32069	A	1	2.61	33.80	53.56	10.03	.87	5.05	73.73	1.57	8.75	1.0	7,372	13,270
				2		34.71	54.99	10.30	.89	4.89	75.71	1.61	6.10		7,570	13,626
				3		38.69	61.31		.99	5.45	84.40	1.79	7.37		8,439	15,190

WASHINGTON.																
KITITAS COUNTY.																
Ellensburg, 25 miles northwest of; NW. $\frac{1}{4}$ sec. 14, T. 18 N., R. 15 E., open prospect (23 feet west from mouth of prospect).	B	26223	278	1	10.34	30.39	43.37	15.90	1.43	5.52	61.31	1.46	14.39	8.9	6,114	11,005
				2	.....	33.89	48.38	17.73	1.59	4.89	68.38	1.63	5.78	.....	6,819	12,274
				3	.....	41.19	58.81	.....	1.93	5.92	83.12	1.98	7.05	.....	8,288	14,918
LEWIS COUNTY.																
Centralia, 3 miles north of; NW. $\frac{1}{4}$ sec. 30, T. 15 N., R. 2 W.; Ford's Prairie mine (face of main entry near last plane).	B	*29564	279	1	29.81	32.88	29.49	7.82	.61	6.64	43.97	.75	40.21	21.5	4,103	7,547
				2	.....	46.84	42.02	11.14	.87	4.74	62.64	1.07	19.54	.....	5,974	10,753
				3	.....	52.71	47.29	.....	.98	5.33	70.50	1.20	21.99	.....	6,723	12,101
6 miles east of; NE. $\frac{1}{4}$ sec. 17, T. 14 N., R. 1 W.; Monarch mine (face of plane).	B	*29570	279	1	27.82	33.66	29.74	8.78	.99	6.68	45.35	.87	37.33	22.5	4,412	7,942
				2	.....	46.63	41.21	12.16	1.37	4.97	62.83	1.21	17.46	.....	6,112	11,002
				3	.....	53.08	46.92	.....	1.56	5.66	71.53	1.38	19.87	.....	6,958	12,524
Chelalis; W. $\frac{1}{4}$ sec. 29, T. 14 N., R. 2 W.; Superior mine, Superior No. 2 bed (face of entry, beyond 34 chute).	B	*29568	279	1	30.78	33.06	27.73	8.43	.75	6.81	42.62	.80	40.59	25.3	4,174	7,513
				2	.....	47.76	40.06	12.18	1.08	4.90	61.57	1.16	19.11	.....	6,030	10,854
				3	.....	54.38	45.62	.....	1.23	5.58	70.11	1.32	21.76	.....	6,806	12,359
2 miles southeast of; NE. $\frac{1}{4}$ sec. 33, T. 14 N., R. 2 W.; Sheldon mine (face of main entry).	B	*29569	279	1	31.00	32.65	30.55	5.80	.46	6.96	44.76	.76	41.26	22.3	4,286	7,715
				2	.....	47.32	44.27	8.41	.67	5.10	64.87	1.10	19.85	.....	6,212	11,182
				3	.....	51.66	48.34	.....	.73	5.57	70.83	1.20	21.67	.....	6,782	12,208
Mendota; E. $\frac{1}{4}$ sec. 3, T. 14 N., R. 1 W.; Mendota mine (face of 5 north entry).	B	*29565	280	1	19.75	35.16	31.62	13.47	1.17	6.00	48.60	.92	29.84	12.0	4,820	8,676
				2	.....	43.81	39.41	16.78	1.46	4.75	60.56	1.15	15.30	.....	6,006	10,811
				3	.....	52.64	47.36	.....	1.75	5.71	72.77	1.38	18.39	.....	7,217	12,991
THURSTON COUNTY.																
Tono; NW. $\frac{1}{4}$ sec. 21, T. 15 N., R. 1 W.; Hannaford mine (face of 7 room, 2 entry, 2 main slope entry, upper bench).	B	*29566	280	1	21.69	34.77	33.29	10.25	1.24	6.29	48.91	.93	32.38	16.3	4,831	8,606
				2	.....	44.40	42.51	13.09	1.58	4.95	62.46	1.19	16.73	.....	6,169	11,104
				3	.....	51.09	48.91	.....	1.82	5.70	71.87	1.37	19.24	.....	7,008	12,776
Same (face of 7 room, 2 entry, 2 main entry, mining bench).....	B	*29567	280	1	22.51	33.91	34.69	8.89	.61	6.30	49.87	1.04	33.29	15.1	4,823	8,681
				2	.....	43.76	44.77	11.47	.79	4.90	64.36	1.34	17.14	.....	6,224	11,203
				3	.....	49.43	50.57	.....	.89	5.54	72.70	1.51	19.36	.....	7,031	12,656
WHATCOM COUNTY.																
Bellingham, 1 mile from; sec. 13, T. 38 N., R. 2 E.; Bellingham mine, No. 1 bed (near foot of slope).	A	*32034	281	1	8.35	34.82	40.32	16.51	.24	5.10	57.33	1.09	19.73	2.3	5,605	10,089
				2		37.99	44.00	18.01	.26	4.55	62.55	1.19	13.44		6,116	11,000
				3		46.34	53.56		.32	5.55	76.29	1.45	16.39		7,460	13,428

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Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes <i>a</i> (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed car- bon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British ther- mal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA.																
BROOKE COUNTY.																
Collier, 1½ miles west of; Locust Grove Nos. 1 and 2 mines, Pittsburgh bed (face of main entry, on right rib).	281	31627	A	1	4.32	38.14	49.03	8.51	2.32	.....	.....	.....	.....	2.6	7,191	12,944
Same (slant at face of 4 face entry).....	281	31628	A	1	4.24	37.71	50.28	7.77	2.35	.....	.....	.....	.....	2.4	7,264	13,075
Same (face of 1 face entry, on right rib).....	281	31629	A	1	4.79	36.53	50.23	8.45	2.65	.....	.....	.....	.....	2.9	7,120	12,816
Same (face of 5 face entry, on left rib).....	281	31630	A	1	4.35	37.58	50.11	7.96	2.95	.....	.....	.....	.....	2.7	7,212	12,982
Same (face of 6 left butt entry, on left rib).....	281	31631	A	1	4.43	36.87	50.56	8.14	2.39	.....	.....	.....	.....	2.6	7,195	12,951
Same (composite of samples 31627 to 31631).....	281	31632	A	1	4.43	37.38	50.11	8.08	2.59	5.30	72.06	1.44	10.53	2.6	7,189	12,940
				2	.....	39.11	52.44	8.45	2.71	5.03	75.40	1.51	6.90	.....	7,523	13,541
				3	.....	42.72	57.28	.....	2.96	5.49	82.36	1.65	7.54	.....	8,217	14,791
Short Creek, 5 miles south of Wellsburg; Beech Bottom mine, Pitts- burgh bed (on left rib, 75 feet in 17 room, 6 west entry, 4 north entry).....	282	31597	A	1	4.45	37.14	52.27	6.14	1.41	.....	.....	.....	.....	2.5	7,407	13,333
Same (on left rib, face of 3 entry, 4 north entry).....	282	31598	A	1	3.88	36.91	48.20	11.01	1.99	.....	.....	.....	.....	2.1	7,017	12,631
Same (face of 3 east butt entry, 4 north face entry).....	282	31599	A	1	3.31	38.86	50.29	7.54	1.54	.....	.....	.....	.....	1.6	7,350	13,230
Same (face of main east entry, on left rib).....	282	31600	A	1	2.94	37.29	52.06	7.71	1.81	.....	.....	.....	.....	1.1	7,389	13,300
Same (neck of 3 east butt entry, 4 south face entry).....	282	31601	A	1	4.54	36.01	52.63	6.82	1.43	.....	.....	.....	.....	2.5	7,341	13,214
Same (composite of samples 31597 to 31601).....	282	31602	A	1	3.78	37.58	50.91	7.73	1.65	5.26	73.11	1.43	10.82	1.9	7,291	13,124
				2	.....	39.06	52.91	8.03	1.71	5.03	75.98	1.49	7.76	.....	7,578	13,640
				3	.....	42.47	57.53	.....	1.86	5.47	82.61	1.62	8.44	.....	8,240	14,832
FAYETTE COUNTY.																
Layland, 2 miles north of; Layland Nos. 1, 2, 3, and 4 mines, Fire Creek bed (face of 8 left entry, 4 main entry).....	282	W68180	A	1	2.40	21.10	71.40	5.10	.68	.....	.....	.....	.....	.....	8,045	14,481
Same (face of 11 left entry, 3 main entry).....	282	W68186	A	1	2.80	19.40	71.90	5.90	.49	.....	.....	.....	.....	.....	7,931	14,276
Same (face of 1 room, 26 left entry, 2 main entry).....	282	W68196	A	1	3.10	19.20	74.20	3.50	.73	.....	.....	.....	.....	.....	8,169	14,704
Same (face of 7 left entry, main tunnel entry).....	282	W68224	A	1	2.40	20.90	70.90	5.80	.54	.....	.....	.....	.....	.....	8,032	14,458
Same (face of 8 room, 17 left entry, 1 main entry).....	282	W68225	A	1	2.50	19.00	73.90	4.60	.78	.....	.....	.....	.....	.....	8,110	14,598
Same (composite of samples W68180, W68186, W68196, W68224, and W68225).....	282	30147	A	1	2.60	18.78	73.55	5.07	.75	4.69	82.79	1.56	5.14	.....	8,031	14,456
				2	.....	19.28	75.51	5.21	.77	4.52	85.00	1.60	2.90	.....	8,245	14,811
				3	.....	20.34	79.66	.....	.81	4.77	89.68	1.69	3.05	.....	8,698	15,656

Same (car samples of run-of-mine coal).	283	W69233 W69234	C	1	1.75	19.94	72.37	5.94	62	7.980	14.364
Minden: Minden No. 2 mine, Sewell bed (face of 15 room, 1 crosscut, 10 left entry, 2 main entry).	284	W68113	A	1	2.40	24.70	69.70	3.20	67	8.122	14.620
Same (face of 12 room, 2 main entry).	284	W68127	A	1	2.10	25.20	70.10	2.60	54	8.267	14.881
Same (face of 1 crosscut, 13 left entry, 1 main entry).	284	W68133	A	1	2.40	24.60	69.00	3.60	44	8.143	14.657
Same (composite of samples W68113, W68127, and W68133).	284	30149	A	2	2.40	24.87	69.58	3.15	75	8.194	14.749
						25.48	71.29	3.23	77	8.395	15.111
						26.33	73.67	3.82	80	8.675	15.615
Minden No. 3 mine, Sewell bed (face of 20 room, 10 right entry, 2 main entry).	284	30046	A	1	2.30	25.10	69.81	2.79	55	8.255	14.859
						25.69	71.45	2.86	56	8.449	15.208
						26.45	73.55	3.01	58	8.697	15.605
						25.00	68.90	3.70	39	8.135	14.654
Minden No. 4 mine, Sewell bed (in break-through 11 entry, left entry, 3 main north entry).	284	W68124	A	1	2.40	25.00	68.90	3.70	39	8.135	14.654
Same (face of 21 room, 9 left entry, 2 main entry).	284	W68125	A	1	2.90	25.00	70.40	1.70	49	8.267	14.881
Same (head of straight main entry).	284	W68131	A	1	2.40	25.30	70.20	2.10	39	8.315	14.967
Same (composite of samples W68124, W68125, and W68131).	284	30150	A	1	2.57	25.34	68.94	3.15	50	8.216	14.789
						26.01	70.76	3.23	51	8.433	15.179
						26.88	73.12	3.53	53	8.715	15.687
Minden No. 5 mine, Sewell bed (19 right entry, 1 main entry).	284	W68116	A	1	2.70	24.70	70.70	1.90	44	8.296	14.933
Same (10 right entry, 3 main entry).	284	W68119	A	1	2.90	24.10	71.10	1.90	53	8.202	14.872
Same (face of 15 room, 1 right entry, 2 main entry).	284	W68120	A	1	2.80	24.60	69.20	3.40	106	8.106	14.699
Same (face of 1 main entry).	284	W68121	A	1	3.50	24.40	67.30	4.80	107	8.920	14.256
Same (composite of samples W68116, W68119, W68120, and W68121).	284	30151	A	1	2.97	23.73	69.93	3.37	104	8.119	14.614
						24.46	72.07	3.47	107	8.367	15.061
						25.34	74.66	1.11	57	8.082	15.001
						23.77	69.72	4.51	58	8.247	14.548
Minden Nos. 2, 3, 4, and 5 mines, Sewell bed (car samples of run-of-mine coal from 12 cars).	284	W69231 W69232	C	1	2.00	23.77	69.72	4.51	57	8.045	15.501
						24.25	71.15	4.60	61	8.178	14.720
1½ miles northeast of: Rock Lick No. 4 mine, Sewell bed (face of 4 main entry).	285	W68114	A	1	3.00	25.80	68.70	2.50	44	8.236	14.801
Same (face of 2 main entry).	285	W68126	A	1	2.60	24.50	70.80	2.10	44	8.275	14.895
Same (face of straight main entry).	285	W68132	A	1	2.20	25.40	70.00	2.40	47	8.234	14.821
Same (composite of samples W68114, W68126, and W68132).	285	30157	A	2	2.60	25.45	69.39	2.56	47	8.483	15.217
						26.13	71.24	2.63	48	8.853	15.728
						26.84	73.16	3.98	48	8.335	15.003
Same (tippie samples of run-of-mine coal).	285	W70120 W70123	C	1	1.83	25.21	68.98	3.98	48	8.687	15.686
						25.68	70.27	4.05	51	8.173	14.712
						26.76	73.24	3.38	47	8.838	15.035
Same (car samples of loaded run-of-mine coal, Rock Lick Nos. 2 and 4 mines).	285	W69293 W69294	C	1	2.15	24.41	70.06	3.45	48	8.631	15.572
						24.95	71.60	3.45	48		
						25.84	74.16	3.45	50		

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Mount Storm. 1 mile north of; Koontz mine, Thomas bed (at break-through from 1 right entry).	288	V'69070	B	1	3.89	15.68	75.42	5.10	.53																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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^d The form of analysis is denoted by number as follows: 1=sample as received; 2=dried at a temperature of 105°C; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes <i>a</i> (page).	Sample.		Proximate.						Ultimate.				Calorific value.		
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
MCDOWELL COUNTY—continued.																
Pear Wallow, $\frac{3}{4}$ mile east (?) of Roanoke mine, Pocahontas No. 3 bed (face of 20 room, 13 entry).	292	W67990	A	1	2.50	17.80	73.40	6.30	0.44	.....	.....	.....	.....	.....	7,957	14,323
Same (face of 28 room, 2 diagonal entry).	292	W67991	A	1	2.20	17.70	75.20	4.90	.44	.....	.....	.....	.....	.....	8,150	14,670
Same (face of 27 room, 15 entry).	292	W67993	A	1	2.40	17.80	75.50	4.30	.39	.....	.....	.....	.....	.....	8,138	14,648
Same (composite of samples W67990, W67991, and W67993).	292	29917	A	2	2.37	18.47	73.94	5.22	.43	4.52	83.85	1.17	4.81	.....	8,105	14,589
					.....	18.92	75.73	5.35	.44	4.36	85.89	1.20	2.76	.....	8,302	14,944
				3	.....	19.99	80.01	.....	.46	4.61	90.74	1.27	2.92	.....	8,771	15,788
Same (car sample of loaded coal from 4 cars).	292	30232	C	1	2.50	16.89	71.23	9.38	.43	4.31	79.97	1.08	4.83	.....	7,677	13,819
				2	.....	17.32	73.06	9.62	.44	4.13	82.02	1.11	2.68	.....	7,874	14,173
				3	.....	19.16	80.84	.....	.49	4.57	90.75	1.23	2.96	.....	8,712	15,682
	293	W68085	A	1	1.50	18.10	74.00	6.40	.94	.....	.....	.....	.....	.....	8,043	14,472
Berwind, $1\frac{1}{2}$ miles northeast of; Berwind No. 1 mine, Pocahontas No. 3 bed (face of 3 left entry in No. 14 mine).	293	W68091	A	1	2.00	20.20	73.40	4.40	.93	.....	.....	.....	.....	.....	8,189	14,740
Same (face of main heading in No. 14 mine).	293	W68092	A	1	1.50	18.70	75.40	4.40	.79	.....	.....	.....	.....	.....	8,210	14,778
Same (1 pillar, 2 left entry, 3 right entry).	293	30171	A	1	1.67	19.13	74.06	5.14	1.03	4.54	84.15	1.13	4.01	.....	8,139	14,650
Same (composite of samples W68085, W68091, and W68092).	293		A	2	.....	19.45	75.32	5.23	1.05	4.42	85.58	1.15	2.57	.....	8,277	14,899
				3	.....	20.52	79.48	.....	1.11	4.66	90.30	1.21	2.72	.....	8,734	15,721
	293	W70263	C	1	1.23	18.37	73.78	6.62	.84	.....	.....	.....	.....	.....	8,052	14,494
		W70264		2	.....	18.60	74.70	6.70	.85	.....	.....	.....	.....	.....	8,163	14,675
		W70265		3	.....	19.94	80.06	.....	.91	.....	.....	.....	.....	.....	8,738	15,729
Same (tipple samples of coal being loaded).	294	W70266			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	294	W68081	A	1	1.60	19.00	73.30	6.00	.79	.....	.....	.....	.....	.....	8,075	14,535
Berwind No. 2 mine, Pocahontas No. 3 bed (face of 1 left entry, 1 right entry, 4 left entry).	294	W68082	A	1	1.50	18.10	74.20	6.20	.99	.....	.....	.....	.....	.....	8,025	14,445
Same (8 pillar, 3 right entry).	294	W68087	A	1	1.40	18.90	69.60	10.10	.79	.....	.....	.....	.....	.....	7,688	13,838
Same (face of 9 left entry).	294	29978	A	2	1.50	18.55	72.66	7.29	.97	4.36	82.62	1.11	3.65	.....	7,966	14,339
Same (composite of samples W68081, W68082, and W68087).	294		A	1	.....	18.83	73.77	7.40	.98	4.25	83.88	1.13	2.36	.....	8,087	14,557
				3	.....	21.33	79.67	.....	1.06	4.59	90.58	1.22	2.55	.....	8,733	15,719

[illegible]

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

1/2 mile west of; Helena mine, Sewell bed (head of 23 entry).....	300	25886	A	1	2.10	20.17	74.62	3.11	.57	4.70	85.44	1.43	4.75	.....	8,296	14,933
				2	.....	20.60	76.22	3.18	.58	4.57	87.27	1.46	2.94	.....	8,474	15,253
1 mile west of; Helena or Superior No. 3 mine, Sewell bed (face of 5 headings).....	301	W70212	A	1	2.50	19.30	74.00	4.00	.68	4.72	90.13	1.51	3.04	.....	8,752	15,754
				2	.....	20.00	75.90	4.10	.70	.....	.....	.....	.....	.....	8,189	14,740
				3	.....	20.86	79.14	.....	.73	.....	.....	.....	.....	.....	8,395	15,110
Same (face of 15 cross entry, 3 left entry).....	301	W70213	A	1	1.70	20.35	71.07	6.88	.59	.....	.....	.....	.....	.....	8,756	15,769
				2	.....	20.70	72.30	7.00	.60	.....	.....	.....	.....	.....	7,987	14,340
				3	.....	22.26	77.74	.....	.65	.....	.....	.....	.....	.....	8,106	14,590
Same (face of 23 left entry, main entry).....	301	W70214	A	1	1.90	19.91	73.19	5.00	.98	.....	.....	.....	.....	.....	8,717	15,690
				2	.....	20.30	74.60	5.10	1.00	.....	.....	.....	.....	.....	8,117	14,610
				3	.....	21.39	78.61	.....	1.05	.....	.....	.....	.....	.....	8,272	14,890
															8,722	15,700
Same (tipple samples of coal being loaded).....	301	W70219 W70220 W70221 W70222	C	1 2 3	2.13 19.95 21.34	19.53 73.52 78.66	71.95 73.52 78.66	6.39 6.53	.69 .70 .75	.....	.....	.....	.....	.....	7,983	14,370
															8,157	14,683
															8,727	15,709
Eckman, 1 mile east of; Pulaski No. 2 mine, 1 ocabontas No. 3 bed (on pillar, 3 left entry, 34 cross entry).....	302	26615	A	1	2.83	18.46	74.32	4.39	.60	.....	.....	.....	.....	.....	8,155	14,679
Same (on pillar of 4 room, 1 dip entry).....	302	26616	A	1	3.04	16.74	75.64	4.58	.58	.....	.....	.....	.....	.....	8,122	14,560
Same (composite of samples 26615 and 26616).....	302	26617	A	1	2.90	17.34	75.29	4.47	.60	4.45	83.59	1.09	5.50	.....	8,131	14,636
				2	.....	17.86	77.54	4.60	.62	4.25	86.40	1.12	3.01	.....	8,374	15,073
				3	.....	18.72	81.28	.....	.65	4.45	90.56	1.17	3.17	.....	8,778	15,800
Same (on left, in by rib of 3 cross entry, 30 right cross entry, between 10 and 11 rooms).....	302	26618	A	1	3.05	17.70	74.67	4.58	.59	.....	.....	.....	.....	.....	8,088	14,620
Same (1 room, opposite 1 break-through, milk-dairy entry).....	302	26619	A	1	3.51	17.14	75.08	4.27	.56	.....	.....	.....	.....	.....	8,055	14,499
Same (nec. of 23 room, 2 cross entry, 36 cross entry).....	302	26620	A	1	2.99	18.32	74.06	4.63	.59	.....	.....	.....	.....	.....	8,110	14,498
Same (face of 12 room, 20 feet from 1 left entry, 34 cross entry).....	302	26621	A	1	3.65	17.29	75.11	3.95	.56	.....	.....	.....	.....	.....	8,069	14,524
Same (face of 5 room, 90 feet from slant entry, 6 cross entry, 36 left entry).....	302	26622	A	1	2.50	19.04	74.35	4.11	.65	.....	.....	.....	.....	.....	8,178	14,720
Same (composite of samples 26618, 26619, 26620, 26621, and 26622)	302	26623	A	1	3.14	17.71	74.85	4.27	.59	4.61	83.76	1.15	5.52	.....	8,095	14,571
				2	.....	18.31	77.28	4.41	.61	4.40	86.47	1.19	2.92	.....	8,357	15,043
				3	.....	19.15	80.85	.....	.64	4.60	90.46	1.24	3.06	.....	8,742	15,736
Same (face of 1 room, 3 crosscut, 36 left entry).....	303	W67929	A	1	2.80	16.90	75.60	4.70	.53	.....	.....	.....	.....	.....	8,138	14,648
Same (face of 8 room, 2 crosscut, 34 entry).....	303	W67956	A	1	2.30	17.10	75.80	4.80	.44	.....	.....	.....	.....	.....	8,166	14,699
Same (face of 12 room, 37 entry, 2 main entry).....	303	W68011	A	1	2.30	18.00	75.80	3.90	.49	.....	.....	.....	.....	.....	8,213	14,783
Same (composite of samples W67929, W67956, and W68011).....	303	29987	A	1	2.47	17.57	75.62	4.34	.58	4.51	84.77	1.16	4.64	.....	8,155	14,679
				2	.....	18.01	77.54	4.45	.59	4.35	86.92	1.19	2.50	.....	8,362	15,052
				3	.....	18.85	81.15	.....	.62	4.55	90.97	1.25	2.61	.....	8,752	15,734
															7,866	14,139
Same (car samples of loaded run-of-mine coal from 9 cars).....	302	W69014 W69015	C	1 2 3	2.35 17.40 18.72	16.99 75.55 81.28	73.78 75.55 81.28	6.88 7.05	.52 .53 .57	.....	.....	.....	.....	.....	8,056	14,580
															8,667	15,600

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

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^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
WEST VIRGINIA—Continued. MCDOWELL COUNTY—continued.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	303	26610	A	1	377	17.47	75.23	3.53	0.57					3.2	8,136	14,645
	303	26611	A	1	3.24	17.34	74.85	4.57	.62					2.9	8,095	14,571
	303	26612	A	1	3.81	17.83	74.68	3.68	.61					3.1	8,098	14,576
	303	26613	A	1	2.85	18.30	73.97	4.88	.63					2.4	8,075	14,535
	303	26614	A	1	3.35	17.84	74.63	4.18	.63	4.62	83.52	1.00	6.05	2.9	8,103	14,585
			2			18.46	77.21	4.33	.65	4.40	86.42	1.03	3.17		8,384	15,091
			3			19.30	80.70		.68	4.60	90.33	1.08	3.31		8,764	15,775
		W67935	A	1	1.60	17.00	76.60	4.80	.49						8,167	14,701
	304	W67937	A	1	1.90	17.00	75.80	5.30	.49						8,151	14,636
	304	W67938	A	1	1.60	17.10	74.70	6.60	.54						8,018	14,432
	304	29915	A	1	1.70	17.72	74.83	5.75	.58	4.39	84.27	1.15	3.86		8,069	14,578
			2			18.03	76.12	5.85	.59	4.27	85.73	1.17	2.39		8,239	14,830
			3			19.15	80.85		.63	4.54	91.05	1.24	2.54		7,751	15,752
		W68839		1	2.80	16.23	71.44	9.53	.52						7,620	13,715
	304	W68840	C	2		16.70	73.50	9.80	.53						7,839	14,110
305	W67955	A	1	2.50	18.50	74.40	4.60	.49						8,167	14,701	
Elkhorn; Houston, No. 1 mine, Pocahontas No. 3 bed (on 21 pillar, 40 cross entry). Same (on 16 pillar, 39 entry). Same (composite of samples W67955 and W67959). Houston No. 2 mine, Pocahontas No. 3 bed (face of 3 room, 44 cross entry).	305	W67959	A	1	3.00	17.80	74.90	4.30	.44					8,099	14,578	
	305	29983	A	1	2.75	18.67	74.11	4.47	.48	4.55	84.29	1.21	5.00		8,099	14,578
			2			19.20	76.20	4.60	.49	4.36	86.67	1.24	2.64		8,328	14,900
			3			20.13	79.87		.51	4.57	90.85	1.30	2.77		7,729	15,712
	305	W67962	A	1	2.60	17.50	74.50	5.40	.49						8,074	14,533
	305	W67969	A	1	2.10	18.20	74.80	4.90	.44						8,118	14,612
	305	W67970	A	1	2.60	17.60	75.40	4.40	.39						8,129	14,632
	305	29990	A	1	2.43	18.41	74.20	4.93	.47	4.51	84.19	1.18	4.72		8,099	14,578
			2			18.90	76.05	5.05	.48	4.35	86.29	1.21	2.62		8,301	14,942
			3			19.91	80.09		.51	4.58	90.88	1.27	2.76		8,743	15,739

Same (car samples of run-of-mine coal from 9 loaded cars, Hours: ten Nos. 1 and 2 mines).	305	{W 68802 W 68803}	C	1	2.75	16.58	69.29	11.38	44	7.453	13.416
				2	.....	17.05	71.25	11.70	45		
				3	.....	19.31	80.69	.....	51		
Paraday, 4 miles east of: Pressly mine, Pocahontas No. 5 bed (face of 3 room, on right of main entry).	306	26159	B	1	3.26	22.05	71.70	2.99	53	2.9	8.290
				2	.....	22.79	71.12	3.09	55		
				3	.....	23.52	76.48	.....	57		
William, 6 miles west of: Pocahontas No. 3 bed (face of 28 room, 6 crosscut).	306	W 68000	A	1	1.70	17.60	74.90	5.80	44	8.078	14.540
				2	.....	18.00	74.60	5.40	40		
				3	.....	17.00	76.00	4.98	39		
Same (face of 2 main entry, 3 crosscut).	306	W 68022	A	1	2.30	17.40	74.65	4.98	42	8.125	14.625
				2	.....	18.40	76.15	5.08	43		
				3	.....	19.77	80.23	.....	45		
Same (composite of samples W 68000, W 68022, and W 68023).	306	29992	A	1	1.97	18.40	74.65	4.98	42	8.125	14.625
				2	.....	18.40	76.15	5.08	43		
				3	.....	19.77	80.23	.....	45		
Same (car sample of run-of-mine coal from 4 loaded cars).	306	30238	C	1	2.30	16.61	73.23	7.86	43	7.838	14.108
				2	.....	17.00	74.95	8.05	44		
				3	.....	18.49	81.51	.....	48		
Hartwell, 3 miles southwest of: Berwind No. 5 mine, Pocahontas No. 3 bed (face of main heading).	307	W 68069	A	1	3.80	20.80	71.30	4.10	77	8.167	14.593
				2	.....	20.30	73.90	3.70	83		
				3	.....	21.09	78.91	.....	71		
Same (on chain pillar, between 3 and 4 rooms, 3 left entry).	307	W 68072	A	1	2.10	18.00	74.70	4.30	82	8.137	14.683
				2	.....	20.20	72.75	4.08	98		
				3	.....	20.82	74.98	4.20	1.01		
Same (composite of samples W 68069, W 68072, and W 68076).	307	29980	A	1	2.97	20.20	72.75	4.08	98	8.407	15.133
				2	.....	21.73	78.27	.....	1.05		
				3	.....	18.67	69.84	9.34	94		
Same (car sample of run-of-mine coal from 4 loaded cars).	307	30263	C	1	2.15	19.08	71.37	9.53	96	7.868	14.162
				2	.....	21.09	78.91	.....	1.06		
				3	.....	14.80	78.90	5.00	71		
Havaco: Havaco mine, Pocahontas No. 3 bed (face of 1 main entry).	307	W 67996	A	1	1.30	14.80	78.90	5.00	59	8.018	14.492
				2	.....	14.90	76.80	5.20	69		
				3	.....	15.45	77.36	5.35	75		
Same (face of 8 right entry, 1 left entry, main entry).	307	W 68019	A	1	2.00	15.80	77.00	5.20	77	8.090	14.562
				2	.....	15.75	78.80	5.45	76		
				3	.....	16.66	83.34	.....	80		
Same (composite of samples W 67996, W 68019, and W 68020).	307	29991	A	1	1.90	15.45	77.36	5.35	75	8.247	14.845
				2	.....	15.02	74.27	7.96	79		
				3	.....	15.44	76.37	8.19	81		
Same (car sample of run-of-mine coal from 8 loaded cars).	307	30237	C	1	2.75	16.82	83.18		88	7.962	14.332
				2	.....	17.48	71.53	6.53	70		
				3	.....	18.28	71.59	7.33	59		
Hemphill, 1 mile west of: Welch mine, Welch bed (face of 14 left entry, main entry, just in by 35 room).	308	26582	A	1	4.46	17.48	71.53	6.53	70	7.864	14.165
				2	.....	18.28	71.59	7.33	59		
				3	.....	19.36	70.43	7.69	59		
Same (face of last cut-through to air course in 25 room, 200 feet from 15 left air course).	308	26583	A	1	2.80	19.36	70.43	7.69	59	7.857	14.143
				2	.....	18.78	70.58	8.24	51		
				3	.....	18.18	71.42	7.39	63		
Same (face of 1 right entry, main tunnel entry).	308	26584	A	1	2.52	19.36	70.43	7.69	59	7.703	14.027
				2	.....	18.78	70.58	8.24	51		
				3	.....	18.18	71.42	7.39	63		
Same (face of main entry, 400 feet in by 16 entry).	308	26585	A	1	2.40	18.78	70.58	8.24	51	8.066	14.519
				2	.....	18.74	73.61	7.62	65		
				3	.....	20.29	79.71	6.13	57		
Same (composite of samples 26582 to 26585).	308	26586	A	1	3.01	18.18	71.42	7.39	63	7.712	13.882
				2	.....	19.48	70.57	6.13	57		
				3	.....	20.25	73.38	6.37	59		
Same (on pillar of 14 room, 13 entry, 150 feet from 13 entry).	308	26587	A	1	3.82	20.25	73.38	6.37	59	8.018	14.482
				2		21.63	78.37		63		
				3		17.48	71.53	6.53	70		

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^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the Bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes <i>a</i> (page).	Sample.			Proximate.				Ultimate.						Calorific value.	
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
MCDOWELL COUNTY—continued.																
Jenkinjones; Jenkinjones No. 6 mine, Pocahontas No. 3 bed (face of 29 room, 14 double entry).	309	W68083	A	1	2.30	22.30	72.10	3.30	0.49	.....	.....	.....	.....	.....	8,248	14,846
Same (face of 3 room, K-10 entry).	309	W68090	A	1	2.30	22.30	72.10	3.30	.49	.....	.....	.....	.....	.....	8,237	14,827
Same (19 pillar, M-13 entry)	309	W68096	A	1	1.70	21.90	72.30	4.10	.49	.....	.....	.....	.....	.....	8,236	14,825
Same (composite of samples W68083, W68090, and W68096).	309	30160	A	2	2.10	22.12	72.21	3.57	.46	4.76	85.07	1.20	4.94	.....	8,207	14,773
						22.59	73.76	3.65	.47	4.63	86.89	1.23	3.13	.....	8,383	15,089
				3		23.45	76.55	.....	.49	4.81	90.18	1.28	3.24	.....	8,701	15,662
Same (car samples from 8 loaded cars)	309	30256	C	1	2.80	20.80	70.23	6.17	.50	4.72	82.43	1.15	5.03	.....	7,939	14,290
				2		21.40	72.25	6.35	.51	4.54	84.80	1.18	2.62	.....	8,168	14,702
				3		22.85	77.15	.....	.54	4.85	90.55	1.26	2.80	.....	8,722	15,700
Jenkinjones No. 7 mine, Pocahontas No. 3 bed (face of 1 room, 1 right air course).	310	W67985	A	1	2.20	22.60	70.90	4.30	.44	.....	.....	.....	.....	.....	8,192	14,746
Same (face of 11 room, D-4 main entry)	310	W67987	A	1	2.00	21.70	72.00	4.30	.44	.....	.....	.....	.....	.....	8,213	14,783
Same (face of dip entry, near cross entry; screened bone coal).	310	W68028	A	1	1.20	17.20	64.50	17.10	.35	.....	.....	.....	.....	.....	7,095	12,771
Same (face of dip entry, near 1 cross entry)	310	W68029	A	1	2.50	22.50	70.80	4.20	.39	.....	.....	.....	.....	.....	8,191	14,744
Same (face of 11 room, D-4 main entry)	310	W68099	A	1	2.10	22.90	71.30	3.70	.44	.....	.....	.....	.....	.....	8,220	14,796
Same (composite of samples W67985, W67987, W68028, W68029, and W68099).	310	30170	A	2	2.00	21.23	70.12	6.65	.47	4.64	82.30	1.02	4.92	.....	7,970	14,346
				3		21.66	71.55	6.79	.48	4.51	83.98	1.04	3.20	.....	8,133	14,639
				3		23.24	76.76	.....	.51	4.84	90.09	1.12	3.44	.....	8,725	15,705
Same (car sample of run-of-mine coal from 3½ loaded cars)	310	30244	C	1	3.25	21.00	68.90	6.85	.53	4.71	81.04	1.12	5.75	.....	7,845	14,121
				2		21.71	71.21	7.08	.55	4.50	83.76	1.16	2.95	.....	8,109	14,566
				3		23.36	76.64	.....	.59	4.84	90.14	1.25	3.18	.....	8,727	15,709
Jenkinjones No. 8 mine, Pocahontas No. 3 bed (face of right air course, G triple entry).	311	W68088	A	1	2.30	23.20	70.70	3.80	.59	.....	.....	.....	.....	.....	8,221	14,798
Same (face of G-3 heading)	311	W68089	A	1	1.80	23.10	69.80	5.30	.54	.....	.....	.....	.....	.....	8,134	14,641
Same (face of G-4 heading)	311	W68093	A	1	2.00	23.00	69.50	5.40	.54	.....	.....	.....	.....	.....	8,069	14,524
Same (face of 18 room, G-2 entry, 7-1 mine, 8 entry).	311	W68095	A	1	2.00	20.90	73.10	4.00	.41	.....	.....	.....	.....	.....	8,193	14,747
Same (composite of samples W68088, W68089, W68093, and W68095).	311	30172	A	2	2.05	22.61	70.60	4.74	.58	4.79	83.80	1.15	4.94	.....	8,308	14,954
				3		23.08	72.08	4.84	.62	4.66	85.55	1.17	3.19	.....	8,308	14,954
				3		24.25	75.75	.....	.62	4.90	89.90	1.23	3.35	.....	8,731	15,716

311	- 30239	C	1	3. 40	21. 80	68. 15	6. 65	. 52	4. 76	80. 77	1. 10	6. 20	14. 150
			2	.....	22. 57	70. 55	6. 88	. 54	4. 53	83. 61	1. 14	3. 30	14. 607
			3	.....	24. 24	75. 76	.....	. 58	4. 86	89. 79	1. 22	3. 55	15. 680
312	W68033	A	1	1. 20	15. 80	75. 30	7. 70	. 44	.....	.....	.....	.....	7. 915
													14. 247
312	W68034	A	1	1. 80	16. 80	75. 80	5. 60	. 49	.....	.....	.....	.....	8. 056
312	W68035	A	1	2. 00	16. 60	75. 70	5. 70	. 49	.....	.....	.....	.....	14. 501
312	30006	A	1	1. 67	16. 50	76. 00	5. 83	. 53	4. 31	84. 14	1. 11	4. 08	14. 504
			2	.....	16. 78	77. 29	5. 93	. 54	4. 19	85. 57	1. 13	2. 64	14. 494
			3	.....	17. 84	82. 16	.....	. 57	4. 45	90. 96	1. 20	2. 82	14. 740
			3	.....	17. 84	82. 16	.....	. 57	4. 45	90. 96	1. 20	2. 82	15. 669
312	30591	C	1	2. 55	16. 36	72. 84	8. 25	. 58	4. 21	81. 19	1. 09	4. 68	13. 980
			2	.....	16. 79	74. 74	8. 47	. 60	4. 03	83. 31	1. 12	2. 47	13. 930
			3	.....	18. 31	81. 66	3. 20	. 66	4. 40	91. 02	1. 22	2. 70	14. 294
313	W67891	A	1	2. 40	18. 30	76. 10	.....	. 44	.....	.....	.....	.....	8. 676
													15. 617
													14. 911
313	W67894	A	1	2. 30	18. 50	74. 60	4. 60	. 44	.....	.....	.....	.....	8. 136
313	W67967	A	1	2. 50	18. 40	74. 30	4. 80	. 44	.....	.....	.....	.....	14. 639
313	29911	A	1	2. 40	18. 73	74. 68	4. 19	. 45	4. 51	84. 66	1. 17	5. 02	14. 702
			2	.....	19. 19	76. 52	4. 29	. 46	4. 34	86. 74	1. 20	2. 97	15. 064
			3	.....	20. 05	79. 95	.....	. 48	4. 53	90. 63	1. 25	3. 11	15. 739
313	30280	C	1	3. 20	17. 19	72. 15	7. 46	. 48	4. 49	80. 78	1. 16	5. 63	14. 004
			2	.....	17. 76	74. 53	7. 71	. 50	4. 27	83. 45	1. 20	2. 87	14. 464
			3	.....	19. 24	80. 76	.....	. 54	4. 63	90. 42	1. 30	3. 11	15. 674
314	W68002	A	1	2. 10	18. 40	72. 50	7. 00	. 59	.....	.....	.....	.....	8. 708
314	W68003	A	1	2. 70	18. 10	68. 70	10. 50	. 88	4. 52	80. 28	1. 37	4. 76	14. 324
314	29418	A	1	2. 40	18. 61	70. 76	8. 23	. 84	4. 32	80. 28	1. 37	4. 76	13. 635
			2	.....	19. 07	72. 50	8. 43	. 86	4. 35	82. 25	1. 41	2. 70	13. 977
			3	.....	20. 83	79. 17	.....	. 94	4. 75	89. 83	1. 54	2. 94	14. 321
													15. 640
314	{ W70195 W70196 W70197 W70198 W68006 }	{ C C C C A }	{ 1 2 3 3 1 }	{ 2. 30 2. 10 }	{ 18. 15 18. 58 19. 83 17. 90 76. 40 }	{ 73. 39 75. 12 80. 17 75. 54 75. 80 }	{ 6. 16 6. 30 3. 60 }	{ . 61 . 62 . 66 49 }	{ 4. 76 4. 60 }	{ 80. 77 85. 29 }	{ 1. 10 1. 14 }	{ 6. 20 4. 56 }	{ 14. 362 14. 700 15. 688 14. 848 14. 803 }
314	W68007	A	1	2. 00	18. 20	75. 50	4. 30	. 39	.....	.....	.....	.....	8. 224
314	W68010	A	1	2. 00	18. 60	75. 80	3. 60	. 39	.....	.....	.....	.....	14. 900
314	29988	A	1	2. 03	18. 51	75. 54	3. 92	. 49	4. 60	85. 29	1. 14	4. 56	14. 812
			2	.....	18. 89	77. 11	4. 00	. 50	4. 46	87. 06	1. 16	2. 82	13. 118
			3	.....	19. 68	80. 32	.....	. 52	4. 65	90. 69	1. 21	2. 93	13. 748
													7. 49
314	{ W68645 W68646 }	{ C C }	{ 1 2 3 }	{ 2. 45 }	{ 17. 46 17. 90 19. 94 }	{ 70. 09 71. 85 80. 96 }	{ 10. 00 10. 25 }	{ . 47 . 18 . 53 }	{ 4. 65 }	{ 90. 69 }	{ 1. 21 }	{ 2. 93 }	{ 13. 740 14. 085 15. 694 }

a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

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d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes a (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No. b	Kind. c	Condition. d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calorific value.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
MCDOWELL COUNTY—continued.																
Newhall, 1/4 mile northwest of; Berwind No. 6 mine, Pocahontas No. 3 bed (face of 1 right entry).....	315	W68066	A	1	2.60	17.30	75.80	4.30	0.68	.....	.....	.....	.....	.....	8,148	14,666
Same (face of 1 left entry).....	315	W68075	A	1	2.70	16.80	75.20	5.30	.54	4.38	84.32	1.21	4.58	.....	8,034	14,461
Same (composite of samples W68066 and W68075).....	315	29981	A	2	2.07	17.68	75.40	4.85	.66	4.24	86.10	1.24	2.80	.....	8,173	14,711
.....	.....	.....	.....	.....	.....	18.05	77.00	4.95	.67	4.46	90.59	1.30	2.95	.....	8,346	15,023
.....	.....	.....	.....	.....	.....	18.99	81.01	.....	.70	4.46	90.59	1.30	2.95	.....	8,781	15,806
Same (car sample of run-of-mine coal from 9 loaded cars).....	315	30235	C	3	2.60	16.06	72.06	9.28	.78	4.35	79.61	1.08	4.90	.....	7,673	13,811
.....	.....	.....	.....	.....	.....	16.49	73.98	9.53	.80	4.17	81.74	1.11	2.65	.....	7,878	14,180
.....	.....	.....	.....	.....	.....	18.23	81.77	.....	.88	4.61	90.35	1.23	2.93	.....	8,708	15,674
.....	.....	.....	.....	.....	.....	17.70	75.50	3.80	.58	.....	.....	.....	.....	.....	8,183	14,729
1/4 mile southeast of; Berwind No. 7 mine, Pocahontas No. 3 bed (face of main entry, 12 feet from 5 right entry).....	316	W68146	A	1	3.00	17.70	75.50	3.80	.58	.....	.....	.....	.....	.....	8,183	14,729
Same (face of 3 right entry, opposite 12 room).....	316	W68164	A	1	2.60	17.30	75.90	4.20	.63	.....	.....	.....	.....	.....	8,166	14,699
Same (neck of 11 room, 2 left entry).....	316	W68148	A	1	3.20	16.60	75.70	4.50	.63	.....	.....	.....	.....	.....	8,137	14,647
Same (composite of samples W68146, W68148, and W68164).....	316	30168	A	1	2.93	17.33	75.55	4.19	.69	4.61	84.25	1.18	5.08	.....	8,127	14,629
.....	.....	.....	.....	.....	.....	17.85	77.83	4.32	.71	4.41	86.79	1.22	2.55	.....	8,372	15,070
.....	.....	.....	.....	.....	.....	18.66	81.34	.....	.74	4.61	90.71	1.28	2.66	.....	8,750	15,750
Same (car sample of run-of-mine coal).....	316	30259	C	1	2.50	17.09	70.54	9.87	.99	4.35	78.91	1.10	4.78	.....	7,603	13,685
.....	.....	.....	.....	.....	.....	17.53	72.35	10.12	1.02	4.17	80.93	1.13	2.63	.....	7,798	14,036
.....	.....	.....	.....	.....	.....	19.50	80.50	.....	1.13	4.64	90.04	1.26	2.93	.....	8,676	15,617
.....	.....	.....	.....	.....	.....	17.20	75.10	4.90	.63	.....	.....	.....	.....	.....	8,132	14,638
1 1/2 miles east of; Berwind No. 8 mine, Pocahontas No. 3 bed (face of 1 right entry).....	317	W68071	A	1	2.80	17.20	75.10	4.90	.63	.....	.....	.....	.....	.....	8,132	14,638
Same (face of 3 right entry).....	317	W68078	A	1	2.80	16.80	77.00	3.40	.53	.....	.....	.....	.....	.....	8,244	14,839
Same (face of main heading).....	317	W68079	A	1	2.80	17.30	75.20	4.70	.73	.....	.....	.....	.....	.....	8,092	14,566
Same (composite of samples W68071, W68078, and W68079).....	317	29977	A	1	2.80	17.80	75.02	4.38	.69	4.59	84.19	1.22	4.93	.....	8,141	14,654
.....	.....	.....	.....	.....	.....	18.31	77.18	4.51	.71	4.40	86.62	1.25	2.51	.....	8,375	15,075
.....	.....	.....	.....	.....	.....	19.17	80.83	.....	.74	4.61	90.71	1.31	2.63	.....	8,770	15,786
.....	.....	.....	.....	.....	.....	18.68	71.37	7.40	.68	4.39	81.54	1.17	4.82	.....	7,853	14,135
Same (car sample of run-of-mine coal from 8 loaded cars).....	317	30262	C	1	2.55	18.68	71.37	7.40	.68	4.39	81.54	1.17	4.82	.....	7,853	14,135
.....	.....	.....	.....	.....	.....	19.17	73.24	7.59	.70	4.22	83.67	1.20	2.62	.....	8,059	14,506
.....	.....	.....	.....	.....	.....	20.74	79.26	.....	.76	4.57	90.54	1.30	2.83	.....	8,721	15,698

Rederfield: Premier Pocahontas No. 1 mine, Welch bed (car samples from 7 loaded cars).	{318	{W69638 W69639	C	{1 2 3	{2.05	{17.53 17.90 19.93	{70.43 71.90 80.07	{9.99 10.20	{49 50 56																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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^d The form of analysis is denoted by number as follows: 1=sample as received; 2=dried at a temperature of 105°C; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes <i>a</i> (page).	Sample.		Proximate.						Ultimate.					Calorific value.	
		Laboratory No. <i>b</i>	Kind. <i>c</i>	Condition. <i>d</i>	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
MCDOWELL COUNTY—continued.																
Vivian; King mine, Pocahontas No. 3 bed (face 6 north entry, 12 heading).	319	W68024	A	1	2.40	16.50	75.70	5.40	0.49						8,034	14,461
Same (face of 5 room, 8 cross entry).....	319	W68025	A	1	2.40	16.30	76.10	5.20	.49						8,035	14,463
Same (face of 9 room, 9 cross entry, main entry, and 12 heading, 6 north entry; bone coal).	319	W68027	A	1	1.00	13.50	47.70	37.80	.30						5,030	9,054
Same (face of 9 room, 9 cross entry, main entry).....	319	W68030	A	1	1.90	16.90	76.60	4.60	.44						8,165	14,697
Same (composite of samples W68024, W68025, W68027, and W68030).	319	29974	A	1	1.93	15.88	68.76	13.43	.47	4.03	76.43	0.99	4.65		7,300	13,140
				2		16.19	70.12	13.69	.48	3.90	77.93	1.01	2.99		7,444	13,399
				3		18.76	81.24		.56	4.52	90.29	1.17	3.46		8,625	15,525
				1	1.95	16.45	73.71	7.89	.55	4.30	81.79	1.10	4.37		7,831	14,066
Same (car sample from 11 loaded cars).....	319	30261	C	2		16.78	75.17	8.05	.56	4.16	83.42	1.12	2.69		7,987	14,377
				3		18.25	81.75		.61	4.52	90.72	1.22	2.93		8,686	15,635
	320	W68005	A	1	1.50	15.40	76.40	6.70	.64						8,012	14,422
Tidewater mine, Pocahontas No. 3 bed (face of main heading, 23 cross entry).																
Same (5 pillar, 12 cross entry, 6 north entry).....	320	W68008	A	1	1.60	16.00	76.90	5.50	.44						8,138	14,648
Same (face of 26 room, 11 cross entry).....	320	W68009	A	1	1.60	17.20	76.80	4.40	.54						8,243	14,837
Same (composite of samples W68005, W68008, and W68009).....	320	29974	A	1	1.57	16.96	76.02	5.45	.65	4.30	84.46	1.13	4.01		8,140	14,652
				2		17.23	77.23	5.54	.66	4.20	85.81	1.15	2.64		8,270	14,886
				3		18.24	81.76		.70	4.45	90.84	1.22	2.79		8,755	15,759
Same (car sample of run-of-mine coal from 15 cars).....	320	30236	C	1	1.65	16.78	73.16	8.41	.54	4.23	81.30	1.11	4.41		7,812	14,062
				2		17.06	74.39	8.55	.55	4.12	82.66	1.13	2.99		7,943	14,297
				3		18.66	81.34		.60	4.51	90.39	1.24	3.26		8,686	15,635
MARION COUNTY.																
Chiefton, 1 mile from; Consolidation No. 47 mine, Pittsburgh bed (pillar in 16 room, 4 right entry, main south entry; roof coal).	321	28570	A	1	2.38	39.05	50.64	7.93	3.03					1.2	7,521	13,538
				2		40.00	51.88	8.12	3.10						7,705	13,809
				3		43.54	56.46		3.37						8,386	15,095
Same (pillar in 9 room, 3 right entry, 4 south entry).....	321	28571	A	1	2.09	39.61	50.53	7.77	2.61					1.0	7,516	13,583
Same (pillar in 16 room, 4 right entry, main south entry).....	321	28572	A	1	2.27	39.19	51.67	6.87	2.70					1.1	7,639	13,734
Same (face of 5 south entry, in by 6 right entry).....	321	28573	A	1	2.64	40.69	49.54	7.13	3.45					1.8	7,577	13,639
Same (face of 22 room, 1 left entry, 5 south entry).....	321	28574	A	1	2.76	40.63	49.80	6.81	2.84					1.6	7,585	13,653

321	28575	A	1	2.15	39.91	51.13	6.81	2.75	5.65	75.32	1.45	7.69	1.3	7,637	13,747
321	28576	A	2	2.41	40.22	50.34	7.03	2.86	5.71	76.32	1.49	7.69	1.4	7,606	13,691
			3	.....	44.41	55.59	7.20	2.93	5.51	77.18	1.61	5.69	.....	7,794	14,029
	28106	A	1	1.87	38.17	53.58	6.38	2.05	5.94	83.17	.....	6.12	.....	8,369	15,119
													9	7,776	13,997
322	28107	A	1	1.86	38.66	52.58	6.90	2.50	.....	.....	.....	.....	9	7,733	13,919
322	28108	A	1	2.19	39.16	51.46	7.19	2.52	.....	.....	.....	.....	1.1	7,691	13,844
322	28109	A	1	2.21	39.80	51.13	6.86	2.38	.....	.....	.....	.....	1.2	7,712	13,882
321	28110	A	1	1.91	39.19	52.04	6.86	2.35	5.37	76.94	1.46	7.02	1.0	7,716	13,889
			2	.....	39.95	53.06	6.99	2.40	5.26	78.44	1.49	5.42	.....	7,866	14,159
			3	.....	42.95	57.05	.....	2.58	5.66	84.31	1.60	5.82	.....	8,458	15,224
321	28111	A	1	2.18	38.79	51.81	7.22	2.17	.....	.....	.....	.....	1.0	7,657	13,783
			2	.....	39.66	52.96	7.38	2.22	.....	.....	.....	.....	.....	7,828	14,090
			3	.....	42.82	57.18	.....	2.40	.....	.....	.....	.....	.....	8,452	15,214
323	28505	A	1	2.36	38.06	50.42	9.16	2.09	.....	.....	.....	.....	1.0	7,393	13,307
323	28506	A	1	2.71	36.90	55.25	5.14	.66	.....	.....	.....	.....	1.1	7,743	13,937
323	28507	A	1	2.52	37.02	54.87	5.59	.84	.....	.....	.....	.....	1.0	7,736	13,925
323	28508	A	1	2.74	38.14	53.23	5.89	1.20	.....	.....	.....	.....	1.2	7,674	13,813
323	28509	A	1	2.51	37.66	53.25	6.58	1.20	5.44	76.66	1.50	8.62	1.1	7,652	13,774
			2	.....	38.63	54.62	6.75	1.23	5.29	78.63	1.54	6.56	.....	7,849	14,128
			3	.....	41.43	58.57	.....	1.32	5.67	84.32	1.65	7.04	.....	8,417	15,151
324	28432	A	1	2.66	36.75	53.41	7.18	1.65	.....	.....	.....	.....	1.5	7,503	13,505
324	28433	A	1	2.19	38.29	52.72	6.80	2.77	.....	.....	.....	.....	1.1	7,590	13,662
324	28434	A	1	2.85	36.62	54.16	6.37	1.10	.....	.....	.....	.....	1.6	7,559	13,606
324	28435	A	1	2.85	36.74	53.58	6.83	1.32	.....	.....	.....	.....	1.5	7,539	13,570
324	28469	A	1	2.44	37.95	52.46	7.15	2.31	.....	.....	.....	.....	1.3	7,577	13,639
324	28470	A	1	2.25	39.11	51.32	7.32	2.42	.....	.....	.....	.....	1.2	7,563	13,613
324	28440	A	1	2.48	37.44	53.10	6.98	1.91	5.54	75.76	1.51	8.30	1.4	7,563	13,613
			2	.....	38.39	54.45	7.16	1.96	5.39	77.68	1.55	6.26	.....	7,755	13,959
			3	.....	41.35	58.65	.....	2.11	5.81	83.67	1.67	6.74	.....	8,353	15,035
324	28209	A	1	2.50	36.55	54.33	6.62	.87	.....	.....	.....	.....	1.1	7,620	13,716
324	28210	A	1	2.62	37.27	54.49	5.62	1.17	.....	.....	.....	.....	1.5	7,655	13,779
324	28211	A	1	2.62	37.00	54.78	5.50	.87	.....	.....	.....	.....	1.4	7,700	13,878
324	28225	A	1	2.61	37.95	53.21	6.23	.86	.....	.....	.....	.....	1.4	7,630	13,750
324	28226	A	1	2.42	37.32	51.18	6.08	1.51	.....	.....	.....	.....	1.2	7,679	13,822
324	28227	A	1	2.52	38.68	52.17	6.63	.99	.....	.....	.....	.....	1.3	7,613	13,703

Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes <i>a</i> (page).	Sample.			Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.			Calories.	British thermal units.
WEST VIRGINIA—Continued. MARION COUNTY—continued.	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
	2	28212	A	1	2.48	37.27	54.10	6.15	1.06	5.52	77.15	1.55	8.57	1.3	7,651	13,772	
	324			2	.....	38.22	55.47	6.31	1.09	5.37	79.11	1.59	6.53	.....	7,845	14,121	
				3	.....	40.80	59.20	.....	1.16	5.73	84.44	1.70	6.97	.....	8,374	15,073	
	325	28322	A	1	3.21	37.21	54.32	5.26	.79	.....	.....	.....	.....	1.7	7,710	13,878	
	325	28323	A	1	2.50	37.74	54.07	5.69	1.21	.....	.....	.....	.....	1.1	7,723	13,901	
	325	28324	A	1	2.73	37.27	54.63	5.37	1.30	.....	.....	.....	.....	1.2	7,712	13,882	
	325	28325	A	1	2.88	37.07	54.23	5.82	1.14	.....	.....	.....	.....	1.4	7,661	13,790	
	325	28326	A	1	2.47	38.20	53.12	6.21	1.30	.....	.....	.....	.....	1.1	7,654	13,777	
	325	28327	A	1	2.84	37.16	54.77	5.23	.95	.....	.....	.....	.....	1.3	7,705	13,869	
Watson; Consolidation No. 26 mine, Pittsburgh bed (face of 14 room, 4 right butt entry, 5 north entry).	325	28328	A	1	2.73	37.50	54.11	5.66	1.14	5.64	77.32	1.52	8.72	1.3	7,701	13,862	
				2	.....	38.55	55.63	5.82	1.17	5.39	79.49	1.56	6.47	.....	7,917	14,251	
				3	.....	40.93	59.07	.....	1.24	5.83	84.40	1.66	6.87	.....	8,406	15,131	
	326	28139	A	1	2.21	37.99	53.23	6.57	2.18	.....	.....	.....	.....	1.1	7,710	13,878	
	326	28140	A	1	2.33	37.94	52.56	7.17	2.81	.....	.....	.....	.....	1.2	7,622	13,720	
	326	28141	A	1	2.58	37.28	54.42	5.72	1.08	.....	.....	.....	.....	1.3	7,725	13,905	
	326	28142	A	1	2.32	38.26	52.63	6.79	2.28	.....	.....	.....	.....	1.1	7,665	13,797	
	326	28143	A	1	2.27	37.67	53.39	6.67	2.15	5.51	76.94	1.47	7.26	1.2	7,673	13,811	
				2	.....	38.54	54.64	6.82	2.20	5.38	78.73	1.50	5.37	.....	7,851	14,132	
				3	.....	41.36	58.64	.....	2.36	5.77	84.49	1.61	5.77	.....	8,426	15,167	
Same (left rib, 21 room, 5 left butt entry, 8 south entry, main entry, 75 feet from face).	326	28144	A	1	2.35	36.95	54.49	6.21	.80	.....	.....	.....	.....	1.1	7,685	13,833	
				2	.....	37.84	55.80	6.36	.82	.....	.....	.....	.....	.....	7,870	14,166	
				3	.....	40.41	59.59	.....	.88	.....	.....	.....	.....	.....	8,404	15,127	

Warthington, 4 miles north of: Consolidation No. 86 mine, Pittsburgh bed (near 2 face of east main entry, inby first turned face entry).	327	28535	A	1	2.25	38.02	53.59	6.14	.85	.....	.....	.....	.9	7,674	13,813
Same (junction of 4 and 5 west main airways).....	327	28536	A	1	2.73	36.92	54.34	6.01	.85	.....	.....	.....	1.6	7,621	13,718
Same (1 south face, main west heading).....	327	28537	A	1	3.32	37.14	53.27	6.27	.67	.....	.....	.....	2.1	7,554	13,597
Same (2 face of north faces, east main entries, inby 2 pair of butts).....	327	28538	A	1	2.63	37.30	54.57	5.50	.73	.....	.....	.....	1.4	7,675	13,815
Same (composite of samples 28535 to 28538).....	327	28539	A	1	2.77	37.04	54.18	6.01	.79	5.61	76.19	1.55	1.5	7,626	13,727
				2	.....	38.10	55.72	6.18	.81	5.45	78.36	1.59	.....	7,843	14,117
				3	.....	40.61	59.39	.....	.86	5.81	83.52	1.69	.....	8,360	15,048
MARSHALL COUNTY.															
Benwood, 1 mile south of: Hitchman mine, Pittsburgh (No. 8) bed (face of 14 north entry, 50 feet inby 8 east entry).	328	25606	A	1	3.46	41.17	47.36	8.01	4.53	.....	.....	.....	1.7	7,285	13,113
Same (face of 9 west entry, 14 south entry, 12 feet from 14 south entry).	328	25607	A	1	3.54	40.84	47.72	7.90	3.85	.....	.....	.....	1.8	7,373	13,271
Same (face of 16 south entry, 30 feet from 2 main entry).....	328	25608	A	1	3.08	41.86	47.22	7.84	4.54	.....	.....	.....	1.4	7,324	13,183
Same (face of 4 room, 18 west entry, 12 south entry).....	328	25609	A	1	3.03	42.41	46.40	8.16	4.54	.....	.....	.....	1.3	7,302	13,144
Same (rib of 1 room, 1 east entry, 14 north entry).....	328	25610	A	1	2.91	40.38	48.17	8.54	4.99	.....	.....	.....	1.2	7,258	13,064
Same (composite of samples 25606 to 25610).....	328	25611	A	1	3.16	41.61	47.28	7.95	4.48	5.27	71.65	1.08	1.5	7,311	13,160
				2	.....	42.97	48.82	8.21	4.63	5.08	73.99	1.12	.....	7,549	13,588
				3	.....	46.81	53.19	.....	5.04	5.53	80.60	1.22	.....	8,224	14,803
MERCER COUNTY.															
Coaldale, 1 mile west of: Coaldale mine, Pocahontas No. 3 bed (face of Statley entry, 7 left entry).	329	W67890	A	1	2.40	19.00	74.10	4.50	.73	.....	.....	.....	.....	8,204	14,767
Same (face of Keystone entry, 7 left entry).....	329	W67897	A	1	1.60	20.00	74.70	3.70	.74	.....	.....	.....	.....	8,309	14,956
Same (face of 5 entry, main entry).....	329	W67905	A	1	2.10	19.30	74.90	3.70	.59	.....	.....	.....	.....	8,319	14,974
Same (composite of samples W67890, W67897, and W67905).....	329	29923	A	1	2.03	20.29	73.73	3.95	.76	4.73	84.85	1.12	.....	8,230	14,814
				2	.....	20.71	75.26	4.03	.78	4.59	86.61	1.14	.....	8,401	15,122
				3	.....	21.58	78.42	.....	.81	4.78	90.25	1.19	.....	8,754	15,757
Sample (tipple samples of run-of-mine coal being loaded).....	329	W70271	C	1	2.78	19.33	71.64	6.25	.62	.....	.....	.....	.....	7,940	14,291
		W70272		2	.....	19.88	73.69	6.43	.64	.....	.....	.....	.....	8,167	14,700
		W70273		3	.....	21.25	78.75	.....	.68	.....	.....	.....	.....	8,728	15,710
		W70274	A	1	2.20	17.90	75.30	4.60	.59	.....	.....	.....	.....	8,156	14,681
Crystal, 1 mile north of: Crystal No. 1 mine, Pocahontas No. 3 bed (face of 2 room, 3 cross entry, left entry).	329	W67984	A	1	2.40	18.30	75.90	3.40	.49	.....	.....	.....	.....	8,268	14,882
Same (face of 14 room, 1 right entry).....	329	W67986	A	1	1.50	18.20	75.30	5.00	.54	.....	.....	.....	.....	8,184	14,731
Same (on chain pillar, 20 room, haulway, 1 cross entry).....	329	29920	A	1	2.03	19.13	74.30	4.54	.57	4.56	84.96	1.12	.....	8,183	14,729
Same (composite of samples W67984, W67986, and W67988).....	329		A	2	.....	19.53	75.84	4.63	.58	4.42	86.72	1.14	.....	8,353	15,035
				3	.....	20.48	79.52	.....	.61	4.63	90.93	1.20	.....	8,758	15,764
Same (car sample of picked egg coal).....	329	29653	C	1	2.22	16.23	71.27	10.28	.59	.....	.....	.....	1.8	7,613	13,703
				2	.....	16.60	72.89	10.51	.60	.....	.....	.....	.....	7,780	14,015
				3	.....	18.55	81.45	.....	.67	.....	.....	.....	.....	8,700	15,660

^a Figures in column 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the Bureau; all others were analyzed at the Pittsburgh laboratory. An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method (see p. 6).

^c The kind of sample is denoted by letter, as follows: A = mine sample collected by an inspector of the Bureau of Mines; B = mine sample collected by a geologist of the United States Geological Survey, or of a State geological survey; C = car sample taken at the fuel-testing plant or in the field.

^d The form of analysis is denoted by number, as follows: 1 = sample as received; 2 = dried at a temperature of 105° C.; 3 = moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.		Proximate.					Ultimate.					Calorific value.			
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.	
1		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
WEST VIRGINIA—Continued.																	
MERCER COUNTY—continued.																	
Crystal, 1½ miles from; Crystal No. 2 mine, Pocahontas No. 3 bed (face of 34 room, 6 entry). Same (in split on 1 pillar, 7 entry). Same (face of 25 room, 6 entry). Same (composite of samples W68014, W68015, and W68017). Same (car sample of picked run-of-mine coal).	330	W68014	A	1	3.30	17.50	74.80	4.40	0.68						8,111	14,600	
	330	W68015	A	1	2.50	17.60	75.70	4.20	.59						8,206	14,771	
	330	W68017	A	1	2.70	18.00	74.90	4.40	.63						8,166	14,699	
	330	29975	A	1	2.83	18.23	74.49	4.45	.82	4.56	84.12	1.08	4.97		8,142	14,656	
				2		18.76	76.66	4.58	.84	4.37	86.57	1.11	2.53		8,379	15,882	
				3		19.66	80.34		.77	4.58	90.73	1.16	2.65		8,781	15,806	
		29655	C		2.59	17.10	68.60	11.71	.88					2.2	7,469	13,444	
				2		17.55	70.43	12.02	.79						7,668	13,802	
				3		19.95	80.05		.90						8,715	15,687	
					2.50	18.10	75.10	4.30	.49						8,187	14,737	
McComas, ½ mile from; Sagamore No. 1 mine, Pocahontas No. 3 bed (face of crooked entries, 15 feet from face). Same (at breakthrough, 10 feet from face of 2 angle entry). Same (face of left rib, 5 entry). Same (composite of samples W67911, W67928, and W67952). Sagamore No. 2 mine, Pocahontas No. 3 bed (in last breakthrough, F-6 heading).	331	W67911	A	1	2.50	18.10	75.10	4.30							8,198	14,756	
	331	W67928	A	1	2.10	17.60	76.10	4.20	.54						8,040	14,472	
	331	W67952	A	1	3.70	18.30	73.50	4.50	.43						8,158	14,684	
	331	29985	A	1	2.77	18.86	74.14	4.23	.53	4.55	84.71	1.15	4.83		8,390	15,102	
				2		19.40	76.25	4.35	.55	4.36	87.12	1.18	2.44		8,772	15,790	
				3		20.28	79.72		.58	4.56	91.08	1.23	2.55		8,250	14,850	
	331	W68012	A	1	2.20	18.70	75.30	3.80	.44						8,189	14,740	
	331	W68013	A	1	2.70	18.00	75.40	3.90	.39						8,246	14,843	
	331	W68016	A	1	2.20	18.50	75.70	3.60	.44						8,205	14,769	
	331	29986	A	1	2.37	18.79	74.94	3.90	.56	4.64	84.84	1.14	4.92		8,404	15,127	
Same (composite of samples W68012, W68013, and W68016). Same (car samples of loaded coal from Sagamore Nos. 1 and 2 mines). Thomas No. 1 mine, Pocahontas No. 3 bed (on 13 pillar, 22 entry). Same (face of pinnacle heading).						19.25	76.76	3.99	.57	4.49	86.90	1.17	2.88		8,754	15,757	
						20.05	79.95		.59	4.68	90.52	1.22	2.99		7,700	13,859	
	331	W69016		1	4.85	17.41	71.27	6.47	.52						8,092	14,565	
		W69017	C	2		18.30	74.90	6.80	.55						8,682	15,628	
	332	W67906	A	1	2.30	17.94	80.36		.59						8,053	14,495	
332	W67907	A	1	2.40	17.40	75.60	4.60	.54	.54					8,128	14,630		

332	Same (face of 11 room, 2 entry, 20 heading).....	W67908	A	1	2.40	16.70	76.20	4.70	.54	.....	.....	.....	8.140	14.652	
332	Same (face of 3 room, 18 heading, 22 main entry).....	W67912	A	1	2.10	16.80	77.10	4.00	.49	.....	.....	.....	8.226	14.807	
332	Same (on 7 pillar, 16 heading, 2 main entry).....	W67914	A	1	2.30	16.20	74.90	6.60	.54	.....	.....	.....	7.973	14.351	
332	Same (composite of samples W67908, W67912, and W67914).....	29916	A	1	2.30	18.36	73.81	5.53	.53	4.45	84.10	1.11	4.28	8.077	14.539
				2	.....	18.79	75.55	5.66	.54	4.29	86.08	1.14	2.29	8.267	14.881
				3	.....	19.92	80.08	.....	.57	4.55	91.24	1.21	2.43	8.763	15.775
332	Same (car sample of screened run-of-mine coal).....	29657	C	1	2.40	16.38	70.11	11.11	.62	.....	.....	.....	2.1	7.325	13.545
				2	.....	16.78	71.84	11.38	.64	.....	.....	.....	.....	7.710	13.878
				3	.....	18.93	81.07	.....	.72	.....	.....	.....	.....	8.700	15.660
333	Matoaka, 2 miles west of: Thomas No. 2 mine, Pocahontas No. 3 bed (face of E entry, B entry).....	W67909	A	1	2.40	17.20	75.90	4.50	.54	.....	.....	.....	8.115	14.607	
333	Same (face of 4 heading).....	W67913	A	1	1.80	17.60	75.90	4.70	.54	.....	.....	.....	8.154	14.677	
333	Same (on rib of A heading).....	W67963	A	1	2.20	18.00	74.40	5.40	.49	.....	.....	.....	8.096	14.573	
333	Same (face of D entry, B entry).....	W67968	A	1	3.50	17.50	74.30	4.70	.48	.....	.....	.....	8.025	14.445	
333	Same (composite of samples W67909, W67913, W67963, and W67968).....	29983	A	1	2.48	17.82	74.75	4.95	.58	4.49	83.83	1.10	5.05	8.093	14.567
				2	.....	18.27	76.65	5.08	.59	4.32	85.96	1.13	2.92	8.269	14.938
				3	.....	19.25	80.75	.....	.62	4.55	90.56	1.19	3.08	8.743	15.737
333	Same (car sample of loaded coal).....	29659	C	1	3.15	16.11	65.70	15.04	.50	.....	.....	.....	2.9	7.104	12.787
				2	.....	16.63	67.84	15.53	.52	.....	.....	.....	.....	7.335	13.203
				3	.....	19.69	80.31	.....	.62	.....	.....	.....	.....	8.684	15.631
334	Simmons, 2 miles northwest of: Booth-Bowen mine, Pocahontas No. 3 bed (face of 10 room, northwest cross air course).....	W67895	A	1	2.20	18.80	75.00	4.00	.49	.....	.....	.....	8.233	14.813	
334	Same (in new drift section, room pillar).....	W67930	A	1	3.00	18.50	73.80	4.70	.68	.....	.....	.....	8.147	14.665	
334	Same (in Klondike section, 16 room).....	W67932	A	1	2.70	17.70	75.40	4.20	.54	.....	.....	.....	8.178	14.720	
234	Same (composite of samples W67895, W67930, and W67932).....	29910	A	1	2.63	19.13	73.92	4.32	.59	4.63	84.24	1.08	5.14	8.113	14.603
				2	.....	19.65	75.91	4.44	.61	4.46	86.52	1.11	2.86	8.332	14.998
				3	.....	20.56	79.44	.....	.64	4.67	90.54	1.16	2.99	8.719	15.694
334	Same (car samples from 10 loaded cars).....	W69018	C	1	3.25	17.90	70.92	7.93	.53	.....	.....	.....	7.700	13.859	
		W69019		2	.....	18.50	73.30	8.20	.55	.....	.....	.....	7.958	14.325	
				3	.....	20.15	79.85	.....	.60	.....	.....	.....	8.670	15.605	
334	2 miles northwest of: Buckeye No. 1 mine, Pocahontas No. 3 bed (pillar of 3 room, to right of north entry).....	26712	A	1	3.07	19.04	74.33	3.56	.55	.....	.....	.....	2.3	8.212	14.782
334	Same (pillar of 9 room, to left of Price's entry).....	26713	A	1	2.16	19.15	74.75	3.94	.53	.....	.....	.....	1.5	8.252	14.854
334	Same (face of 4 room, 200 feet from 3 right entry).....	26714	A	1	3.05	19.48	73.96	3.51	.70	.....	.....	.....	2.4	8.198	14.736
334	Same (pillar of 6 room, 100 feet from Bennett's air course).....	26715	A	1	2.90	18.66	75.36	3.08	.82	.....	.....	.....	2.1	8.252	14.854
334	Same (on left inby rib of 4 room, 160 feet from 5 cross entry).....	26716	A	1	3.26	18.78	74.55	3.41	.91	.....	.....	.....	2.4	8.217	14.791
334	Same (face of 8 room, 100 feet from Sinai air course).....	25717	A	1	3.33	19.95	72.92	3.80	.86	.....	.....	.....	2.5	8.169	14.704
334	Same (composite of samples 26712 to 26717).....	26718	A	1	2.88	18.82	74.72	3.57	.73	4.60	83.94	1.19	5.97	8.228	14.810
				2	.....	19.39	76.93	3.68	.75	4.41	86.43	1.23	3.50	8.472	15.250
				3	.....	20.13	79.87	.....	.78	4.58	89.73	1.28	3.63	8.706	15.833
334	Same (on chain pillar, face of Simmons entry).....	W67893	A	1	2.40	18.30	76.00	3.20	.54	.....	.....	.....	8.293	14.931	
334	Same (face of 6 room, 7 cross entry).....	W67931	A	1	2.80	18.70	75.60	2.90	.63	.....	.....	.....	8.266	14.879	
334	Same (on 7 pillar, 1 parting, north entry).....	W67961	A	1	2.10	18.40	75.70	3.80	.59	.....	.....	.....	8.233	14.855	
334	Same (composite of samples W67893, W67931, and W67961).....	29921	A	1	2.43	19.55	74.61	3.41	.67	4.77	85.19	1.20	4.76	8.239	14.850
				2		20.04	76.47	3.49	.69	4.61	87.31	1.23	2.67	8.455	15.219
				3		20.77	79.23		.71	4.78	90.47	1.27	2.77	8.761	15.770

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337	26699	A	1	3.81	17.43	75.85	2.91	.56					2.9	8,225	14,805
337	26700	A	1	2.87	16.70	76.95	3.48	.57					2.0	8,244	14,839
337	26701	A	2	3.44	16.63	76.37	3.56	.51	4.49	83.82	1.10	6.52	2.6	8,192	14,746
					17.22	79.09	3.69	.53	4.26	86.80	1.14	3.58	.....	8,484	15,271
			3	.....	17.88	82.12	.....	.55	4.42	90.12	1.18	3.73	.....	8,809	15,856
					17.00	76.50	.....	.54	.....	.....	.....	.....	.....	8,192	14,746
338	W67936	A	1	2.60	17.00	76.50	3.90	.54	.....	.....	.....	.....	.....	.....	.....
					17.20	76.60	4.20	.59	.....	.....	.....	.....	.....	8,175	14,715
338	W67965	A	1	2.00	18.40	74.80	4.20	.49	.....	.....	.....	.....	.....	8,146	14,663
338	W67966	A	1	2.60	18.40	74.80	4.20	.49	.....	.....	.....	.....	.....	8,163	14,693
338	29984	A	2	2.40	17.91	73.55	4.14	.61	4.54	84.91	1.16	4.64	.....	8,364	15,055
			2	.....	18.35	77.41	4.24	.62	4.37	87.00	1.19	2.58	.....	8,735	15,723
			3	.....	19.16	80.84	.....	.65	4.56	91.85	1.24	2.70	.....	8,735	15,723
					16.65	72.22	.....	.56	4.44	80.53	1.04	5.55	.....	7,744	13,939
338	30233	C	1	3.05	16.65	72.22	.....	.56	4.44	80.53	1.04	5.55	.....	7,744	13,939
			2	.....	17.17	74.50	8.33	.58	4.23	83.06	1.07	2.73	.....	7,988	14,378
			3	.....	18.73	81.27	.....	.63	4.61	90.61	1.17	2.98	.....	8,714	15,685
					16.10	65.88	15.62	2.54	.....	.....	.....	.....	.....	.....	.....
339	W69072	B	1	2.40	16.10	65.88	15.62	2.54	.....	.....	.....	.....	.....	7,000	12,660
			2	.....	16.50	67.50	16.00	2.60	.....	.....	.....	.....	.....	7,172	12,910
			3	.....	19.64	80.36	.....	3.10	.....	.....	.....	.....	.....	8,539	15,370
339	W69071	B	1	2.40	15.42	71.83	10.35	2.93	.....	.....	.....	.....	.....	7,456	13,420
			2	.....	15.80	73.60	10.60	3.00	.....	.....	.....	.....	.....	7,633	13,740
			3	.....	17.67	82.33	.....	3.36	.....	.....	.....	.....	.....	8,539	15,370
					35.60	55.21	7.00	1.15	.....	.....	.....	.....	.....	7,682	13,828
340	17484	B	1	2.19	35.60	55.21	7.00	1.15	.....	.....	.....	.....	.....	7,854	14,137
			2	.....	36.40	56.44	7.16	1.18	.....	.....	.....	.....	.....	8,460	15,228
			3	.....	39.21	60.79	.....	1.27	.....	.....	.....	.....	.....	7,762	13,972
340	17485	B	1	2.44	34.94	56.53	6.09	1.01	.....	.....	.....	.....	1.0	7,956	14,321
			2	.....	35.81	57.95	6.24	1.04	.....	.....	.....	.....	.....	8,466	15,275
			3	.....	38.19	61.81	.....	1.11	.....	.....	.....	.....	.....	8,466	15,275
340	17486	B	1	2.58	34.58	56.51	6.33	.75	.....	.....	.....	.....	1.1	7,683	13,829
			2	.....	35.50	58.00	6.50	.77	.....	.....	.....	.....	.....	7,887	14,197
			3	.....	37.97	62.03	.....	.82	.....	.....	.....	.....	.....	8,435	15,183
340	17487	B	1	2.69	33.85	57.43	6.03	.66	.....	.....	.....	.....	.....	7,733	13,919
			2	.....	34.78	59.02	6.20	.68	.....	.....	.....	.....	.....	7,946	14,303
			3	.....	37.08	62.92	.....	.72	.....	.....	.....	.....	.....	8,471	15,248
340	17488	B	1	2.44	34.37	56.85	6.34	.95	5.23	77.90	1.54	8.04	1.0	7,721	13,898
			2	.....	35.23	58.27	6.50	.97	5.08	79.85	1.58	6.02	.....	7,914	14,245
			3	.....	37.68	62.32	.....	1.04	5.43	85.40	1.69	6.44	.....	8,464	15,235
339	17482	B	1	2.74	34.14	58.25	4.87	1.45					1.2	7,805	14,049
			2		35.10	59.89	5.01	1.49						8,025	14,445
			3		36.95	63.05		1.57						8,448	15,206

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342	W68115	A	1	2.70	17.20	76.50	3.60	.49							8.178	14.720
342	W68122	A	1	2.90	16.80	76.50	3.80	.44							8.119	14.614
342	W68123	A	1	2.10	18.30	74.50	5.10	.78	.....	.....	.....	.....	.....	.....	8.100	14.580
342	30169	A	1	2.57	17.15	75.93	4.35	.68	.....	.....	.....	.....	.....	.....	8.101	14.582
			2	.....	17.60	77.94	4.46	.70	.....	.....	.....	.....	.....	.....	8.315	14.967
			3	.....	18.42	81.58	.....	.73	.....	.....	.....	.....	.....	.....	8.703	15.665
342	{W69148 W69149}	C	{1 2}	2.90	16.51	72.72	7.87	.71	.....	.....	.....	.....	.....	.....	7.720	13.895
			3	.....	17.00	74.90	8.10	.79	.....	.....	.....	.....	.....	.....	7.930	14.310
344	26683	A	1	2.42	16.94	76.12	4.52	.75	.....	.....	.....	.....	.....	.....	8.651	15.571
344	26684	A	1	2.39	17.45	75.98	4.18	.53	.....	.....	.....	.....	.....	.....	8.126	14.627
344	26685	A	1	2.62	16.73	76.82	3.83	.52	.....	.....	.....	.....	.....	.....	8.190	14.742
344	26686	A	1	3.23	17.72	75.73	3.32	.51	.....	.....	.....	.....	.....	.....	8.185	14.733
344	26687	A	1	2.68	17.17	76.18	3.97	.59	.....	.....	.....	.....	.....	.....	8.166	14.699
			2	.....	17.64	78.28	4.08	.61	.....	.....	.....	.....	.....	.....	8.181	14.726
			3	.....	18.39	81.61	.....	.64	.....	.....	.....	.....	.....	.....	8.406	15.131
344	26688	A	1	2.45	17.46	76.11	3.98	.52	.....	.....	.....	.....	.....	.....	8.763	15.773
344	26689	A	1	2.73	17.77	75.47	4.03	.63	.....	.....	.....	.....	.....	.....	8.207	14.773
344	26690	A	1	2.45	17.54	76.03	3.98	.57	.....	.....	.....	.....	.....	.....	8.160	14.688
			2	.....	17.98	77.94	4.08	.58	.....	.....	.....	.....	.....	.....	8.196	14.753
			3	.....	18.74	81.26	.....	.60	.....	.....	.....	.....	.....	.....	8.402	15.124
344	W68118	A	1	1.80	16.80	76.00	5.40	.49	.....	.....	.....	.....	.....	.....	8.759	15.766
344	W68134	A	1	2.20	16.00	78.10	3.70	.49	.....	.....	.....	.....	.....	.....	8.079	14.542
344	W68135	A	1	1.80	17.40	76.50	4.30	.59	.....	.....	.....	.....	.....	.....	8.206	14.771
344	30167	A	1	1.93	17.05	76.16	4.86	.61	.....	.....	.....	.....	.....	.....	8.119	14.614
			2	.....	17.39	77.65	4.96	.62	.....	.....	.....	.....	.....	.....	8.279	14.902
			3	.....	18.30	81.70	.....	.65	.....	.....	.....	.....	.....	.....	8.711	15.680
344	{W68806 W68807}	C	{1 2}	2.40	15.66	74.77	7.17	.52	.....	.....	.....	.....	.....	.....	7.890	14.201
			3	.....	16.05	76.60	7.35	.53	.....	.....	.....	.....	.....	.....	8.083	14.550
345	W68136	A	1	2.40	17.00	75.20	5.40	.49	.....	.....	.....	.....	.....	.....	8.725	15.704
345	W68137	A	1	3.70	17.90	75.70	2.70	.53	.....	.....	.....	.....	.....	.....	8.055	14.499
345	30148	A	1	3.10	16.88	75.92	4.10	.59	.....	.....	.....	.....	.....	.....	8.029	14.452
			2	.....	17.42	78.35	4.23	.61	.....	.....	.....	.....	.....	.....	8.013	14.423
			3	.....	18.19	81.81	.....	.64	.....	.....	.....	.....	.....	.....	8.269	14.884
345	{W70283 W70284 W70285 W70286}	C	{1 2 3}	1.78	16.99	70.13	11.10	.63							8.034	15.541
					17.30	71.40	11.30	.64							7.547	13.584
					19.50	80.50		.72							7.083	13.830
															8.002	15.392

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Same (composite of samples W68158 and W68159).....	346	30177	A	1	1.40	14.49	61.48	22.63	36	3.63	67.72	1.03	4.63	6,464	11,635
Slab Fork No. 5 mine, Beckley bed (extension of 22 left entry, 1 right entry, 21 left entry).....	346	W68150	A	2	.....	14.70	62.35	22.95	37	3.52	68.68	1.04	3.44	6,556	11,801
Same (face of 6 room, 19 left entry).....	346	W68151	A	3	.....	19.08	80.92	.....	48	4.57	89.14	1.35	4.46	8,509	15,316
Same (9 room, dip workings, 19 right entry, dip entry).....	346	30178	A	1	2.40	17.80	76.30	3.50	59	.....	.....	.....	.....	8,233	14,819
Same (composite of samples W68150 to W68152).....	346	W68152	A	1	2.90	17.70	76.00	3.40	44	.....	.....	.....	.....	8,188	14,738
Same (face of 6 room, 19 left entry).....	346	W68151	A	1	2.60	17.20	76.10	4.10	44	.....	.....	.....	.....	8,170	14,706
Same (face of 6 room, 19 left entry).....	346	W68152	A	1	2.60	17.40	76.32	3.68	53	4.64	84.51	1.51	5.13	8,154	14,677
Same (composite of samples W68150 to W68152).....	346	30178	A	2	.....	17.86	78.36	3.78	54	4.47	86.77	1.55	2.89	8,372	15,070
Same (face of 6 room, 19 left entry).....	346	W68151	A	3	.....	18.56	81.44	.....	56	4.65	90.18	1.61	3.00	8,701	15,862
Same (face of 6 room, 19 left entry).....	346	W68152	A	1	3.15	16.90	73.90	6.05	46	.....	.....	.....	.....	7,856	14,140
Same (face of 6 room, 19 left entry).....	346	W68151	A	2	.....	17.45	76.30	6.25	48	.....	.....	.....	.....	8,111	14,600
Same (face of 6 room, 19 left entry).....	346	W68152	A	3	.....	18.61	81.39	.....	51	.....	.....	.....	.....	8,652	15,573
Same (face of 6 room, 19 left entry).....	346	W68151	A	1	2.00	16.90	75.00	6.10	49	.....	.....	.....	.....	7,977	14,359
Tams, 1 mile east of; Tams Nos. 1, 3, and 4 mines, Beckley bed (face of 6 right entry, 1,500 feet south of entry mouth, No. 1 mine).....	348	W68086	A	1	2.60	17.20	76.80	3.40	44	.....	.....	.....	.....	8,204	14,767
Same (face of air course, No. 3 mine).....	348	W68084	A	1	3.40	17.00	75.40	4.20	68	.....	.....	.....	.....	8,069	14,324
Same (face of main entry, No. 4 mine).....	348	W68080	A	1	2.67	17.00	75.65	4.68	55	4.55	84.11	1.50	4.61	8,091	14,564
Same (composite of samples W68086, W68084, and W68080).....	348	29973	A	2	.....	17.47	77.72	4.81	57	4.37	86.42	1.54	2.29	8,313	14,963
Same (face of 3 room, 4 south entry).....	349	W68168	A	1	.....	18.35	81.65	.....	60	4.59	90.78	1.62	2.41	8,733	15,719
Same (composite of samples W68166 to W68168).....	349	30159	A	3	.....	17.20	73.88	6.56	66	.....	.....	.....	.....	7,880	14,184
Same (face of 3 room, 4 south entry).....	349	W68166	A	1	2.85	16.71	73.85	6.75	68	.....	.....	.....	.....	8,111	14,600
Same (face of 3 room, 4 south entry).....	349	W68167	A	2	.....	17.20	73.85	6.75	73	.....	.....	.....	.....	8,698	15,657
Same (face of 3 room, 4 south entry).....	349	W68168	A	3	.....	18.45	81.55	.....	73	.....	.....	.....	.....	8,213	14,792
Same (face of 3 room, 4 south entry).....	349	W68168	A	1	4.00	21.30	73.00	1.70	48	.....	.....	.....	.....	8,243	14,837
Same (face of 3 room, 4 south entry).....	349	W68168	A	1	3.60	20.10	74.50	1.80	48	.....	.....	.....	.....	8,328	14,990
Same (face of 3 room, 4 south entry).....	349	W68168	A	1	2.80	21.80	73.30	2.10	49	.....	.....	.....	.....	8,225	14,905
Same (face of 3 room, 4 south entry).....	349	30159	A	1	3.47	21.43	73.05	2.05	55	4.94	84.75	1.60	6.11	8,521	15,338
Same (face of 3 room, 4 south entry).....	349	30159	A	2	.....	22.20	75.68	2.12	57	4.71	87.80	1.67	3.13	8,707	15,671
Same (face of 3 room, 4 south entry).....	349	30159	A	3	.....	22.68	77.32	.....	58	4.81	89.71	1.71	3.19	8,958	16,324
Same (face of 3 room, 4 south entry).....	349	W6843	A	1	3.05	20.60	71.02	5.33	58	.....	.....	.....	.....	8,208	14,775
Same (face of 3 room, 4 south entry).....	349	W6844	A	2	.....	21.25	73.25	5.50	60	.....	.....	.....	.....	8,686	15,635
Same (face of 3 room, 4 south entry).....	349	W6844	A	3	.....	22.49	77.51	.....	63	.....	.....	.....	.....	8,335	15,003
Same (face of 3 room, 4 south entry).....	349	W6844	A	1	2.10	17.70	78.00	2.20	49	.....	.....	.....	.....	8,282	14,908
Same (face of 3 room, 4 south entry).....	349	W6844	A	1	2.20	17.20	77.60	3.00	78	.....	.....	.....	.....	8,356	15,041
Same (face of 3 room, 4 south entry).....	349	W6844	A	1	2.15	17.50	77.72	2.63	51	4.59	86.58	1.53	4.16	8,340	15,372
Same (face of 3 room, 4 south entry).....	349	W6844	A	1	17.88	79.43	2.69	52	4.45	88.48	1.56	2.30	.....	8,776	15,797
Same (face of 3 room, 4 south entry).....	349	W6844	A	2	.....	18.37	81.63	.....	53	4.57	90.92	1.60	2.38	8,811	14,960
Same (face of 3 room, 4 south entry).....	349	W6844	A	3	.....	18.37	81.63	.....	53	.....	.....	.....	.....	8,895	15,370
Same (face of 3 room, 4 south entry).....	349	W6844	A	1	3.50	16.79	73.53	6.18	53	.....	.....	.....	.....	8,648	15,566
Same (face of 3 room, 4 south entry).....	349	W6844	A	2		17.40	76.20	6.40	55					8,648	15,566
Same (face of 3 room, 4 south entry).....	349	W6844	A	3		18.59	81.41		59					8,648	15,566

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Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes ^a (page).	Sample.			Proximate.				Ultimate.					Air-drying loss.		Calorific value.	
		Laboratory No. ^b	Kind. ^c	Condition. ^d	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.			Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
WEST VIRGINIA—Continued.																	
RANDOLPH COUNTY.																	
Lanesville; outcrop mine, Red Creek bed (face of outcrop faced back 3 or 4 feet).	351	W69067	B	1 2 3	6.50	17.20 18.40 21.03	64.61 69.10 78.97	11.69 12.50	2.76 2.95 3.37	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	7,006 7,489 8,561	12,610 13,480 13,410	
WYOMING COUNTY.																	
Alpoa, 1½ miles from; Alpha mine, Beckley bed (face of 22 room, main entry, 40 feet from face).	351	W68147	A	1	2.20	18.70	74.70	4.40	.98	.....	.....	.....	.....	.....	8,172	14,710	
Same (50 feet from face of cross-entry heading).	351	W68149	A	1	2.40	17.80	75.20	4.60	1.02	.....	.....	.....	.....	.....	8,169	14,704	
Same (face of 36 room, main entry, 10 feet from face).	351	W68162	A	1	2.30	18.20	75.40	4.10	1.27	.....	.....	.....	.....	.....	8,179	14,722	
Same (pillar in 5 room, 3 air course).	351	W68163	A	1	2.00	18.50	75.20	4.30	.83	.....	.....	.....	.....	.....	8,182	14,728	
Same (composite of samples W68147, W68149, W68162, and W68163).	351	30166	A	2 3	2.23	18.66 19.09 80.02	74.76 76.46 80.02	4.35 4.45	1.23 1.34 1.02	4.58 4.43 4.64	83.93 85.84 89.84	1.38 1.41 1.48	4.51 2.59 2.70	.....	8,146 8,332 8,720	14,663 14,998 15,696	
Same (car samples of run-of-mine coal from 8 loaded cars).....	351	W68841 W68842	C	1 2 3	3.25	18.00 18.60 19.72	73.24 75.70 80.28	5.51 5.70	1.02 1.05 1.11	.....	.....	.....	.....	.....	7,961 8,228 8,725	14,329 14,810 15,705	
WYOMING.																	
LINCOLN COUNTY.																	
Elkol, 6 miles southwest of Kemmerer; Elkol mine, Elkol bed (face of 6 room, 1 south entry).	352	*30735	A	1 2 3	20.98	35.09 44.41 51.57	40.75 51.57 53.73	3.18 4.02	.59 .75 .78	6.22 4.92 5.13	57.09 72.25 75.28	.90 1.14 1.19	32.02 16.92 17.62	7.3	5,498 6,958 7,250	9,896 12,524 13,050	
Same (face of 21 room, 3 north entry).....	352	*30762	A	1 2 3	20.78	35.36 44.63 46.53	40.62 51.28 53.47	3.24 4.09	.69 .87 .91	6.27 5.00 5.21	57.83 73.00 76.11	.90 1.14 1.19	31.07 15.90 16.58	6.1	5,632 7,071 7,372	10,084 12,728 13,270	

Sublet: No. 5 mine, No. 5 or Willow Creek bed (20 feet south of neck of 46 room, 7 north entry).	30793	A	1	3.73	38.08	52.53	5.66	1.32	.....	.....	.....	1.3	7,338	13,208
Same (15 feet south of neck of 70 room, 6 south entry).....	30794	A	1	3.43	38.08	52.83	5.66	.78	.....	.....	.....	1.1	7,409	13,336
Same (45 feet from main slope, 9 south back entry).....	30795	A	1	3.80	37.87	52.83	5.50	.79	.....	.....	.....	1.5	7,345	13,221
Same (face of 8 south entry, at 11 room).....	30796	A	1	3.44	40.21	51.13	5.22	1.03	.....	.....	.....	1.2	7,428	13,370
Same (composite of samples 30793 to 30796).....	30797	A	1	3.58	38.43	52.51	5.48	.97	.....	.....	.....	1.3	7,396	13,313
			2		39.86	54.46	5.68	1.01	5.28	74.45	1.30		7,670	13,806
			3		42.26	57.74		1.07	5.06	77.21	1.35		8,132	14,638
									5.36	81.86	1.43	10.28		

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DESCRIPTION OF SAMPLES.

ALABAMA.

BIBB COUNTY.

BELLE ELLEN. BELLE ELLEN MINE.

Analyses 26276 to 26281 (p. 17). Bituminous coal, Cahaba field, from Belle Ellen mine, a slope mine in Belle Ellen, on the Louisville & Nashville and the Southern R. R. Coal bed, Youngblood; Carboniferous age, Pottsville group. Bed is 32 inches thick and is 400 feet below the Woodstock seam, 36 inches thick, which is not worked there; dips 0° to 23° west; cleat not well defined; bed disturbed by two faults and frequent rolls or horsebacks; roof, tender shale, varying in thickness from a knife edge to 12 inches; floor, fairly smooth, soft fire clay; cover at points of sampling, 1,000 feet. The bed was sampled by E. B. Sutton on October 10, 1916, as described below:

Sections of coal bed in Belle Ellen mine.

Section.....	A. 26276	B. 26277	C. 26278	D. 26279	E. 26280
Laboratory No.....					
Roof, shale and sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
“Rash”.....	^a 3	^a 3	^a 4	^a 2	^a 3
Coal.....	3 4	2 9	2 0	2 8	10
“Mother coal”.....					1
Coal.....					11½
Floor, fire clay.					
Thickness of bed.....	3 7	3 0	2 4	2 10	2 1½
Thickness of coal sampled.....	3 4	2 9	2 0	2 8	1 10½

^a Not included in sample.

Section A (sample 26276) was cut at face of 19 south heading. Section B (sample 26277) was cut at face of 22 north heading. Section C (sample 26278) was cut at face of 2 cross entry, 23 north heading. Section D (sample 26279) was cut at face of 70 room, 18 north heading. Section E (sample 26280) was cut at face of 19 north heading.

The ultimate analysis of a composite sample, made by combining face samples 26276, 26277, 26278, 26279, and 26280, is given under laboratory No. 26281.

System of mining, room and pillar. In 1916 the coal was shot off the solid with permissible explosives, and only light shots were required. About 500 acres remained to be mined. The estimated lifetime of the mine was 15 years. The average daily output was 650 tons.

For description and analyses of other samples of this coal, see Bureau of Mines Bull. 22, pp. 33, 331.

JEFFERSON COUNTY.

BESSEMER. VIRGINIA MINE.

Analyses 26217 to 26222 (p. 17). Bituminous coal, Warrior field, from Virginia mine, a slope mine 7 miles southwest of Bessemer, on the Louisville & Nashville R. R. Coal bed, Nickel Plate; Carboniferous age, Pottsville group. Bed is 5 feet thick and is flat; roof, fairly hard shale, 6 to 7 feet thick, capped with sandstone; floor, fairly hard, smooth fire clay; no cleat; one fault; rolls and horsebacks common; thickness of cover at points of sampling, 600 feet. The bed was sampled by E. B. Sutton on September 25, 1916, as described below:

Sections of coal bed in Virginia mine.

Section..... Laboratory No.....	A. 26217	B. 26218	C. 26219	D. 26220	E. 26222
Roof, shale and sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	5½	6	4½	5½	4½
Shale.....	a 3¾	a 2½	a 5	a 2½	a 4½
Coal.....	2 0	2 1	2 1½	1 8½	2 0½
"Rash".....	a 5	a 3¾	a 3½	a 3	a 2
Shale.....	a 6¼	a 7	a 6	a 7	a 6¼
Coal.....	1 7½	1 8	1 7½	1 7½	1 9½
Floor, fire clay.					
Thickness of bed.....	5 3¾	5 4¼	5 3¾	4 10	5 0½
Thickness of coal sampled.....	4 0¾	4 3	4 1½	3 9½	3 11¾

a Not included in sample.

Section A (sample 26217) was cut at face of 1 north heading, about 6,300 feet northwest of pit mouth. Section B (sample 26218) was cut at face of 19 right heading, about 7,400 feet northwest of pit mouth. Section C (sample 26219) was cut at face of 20 right heading, about 6,000 feet northwest of pit mouth. Section D (sample 26220) was cut at face of 17 right heading, about 6,600 feet northwest of pit mouth. Section E (sample 26222) was cut at face of main right heading, about 6,600 feet northwest of pit mouth.

The ultimate analysis of a composite sample made by combining face samples 26217 to 26220 is given under laboratory No. 26221.

System of mining, room and pillar. In 1916 the coal was undercut by hand and shot down with permissible explosives by shot firers, after the miners had left the mine, from 6 to 10 p. m. The charge was fired by battery. All the output was being taken from advance workings, the daily average output being about 1,000 tons. Haulage was by mules and by gasoline motor to the slope-engine rope. All of the coal went to coke ovens.

MAJESTIC. MAJESTIC MINE.

Analyses 32070 to 32074 (p. 18). Bituminous coal, Warrior field, from Majestic mine, a shaft mine at Majestic, on the Louisville & Nashville R. R. Coal bed, Black Creek; Carboniferous age, Pottsville group. Bed is 1 foot 10 inches to 2 feet 10 inches thick; rolls are common; bed contains some irregular, thin streaks of "mother coal"; roof, hard, sandy shale; floor, smooth, mostly soft fine clay; elevation of entrance above sea, 400 feet; cover at points of sampling, 300 feet. The bed was sampled by W. B. Plank on June 4, 1919, as follows:

Sections of coal bed in Majestic mine.

Section..... Laboratory No.....	A. 32070	B. 32071	C. 32072	D. 32073
Roof, sandy shale and coal:	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 10	2 2	6½	2 2
"Mother coal".....			½	
Coal.....			6	
"Mother coal".....			¼	
Coal.....			9½	
Floor, fire clay.				
Thickness of bed.....	2 10	2 2	1 10¾	2 2
Thickness of coal sampled.....	2 10	2 2	1 10¾	2 2

Section A (sample 32070) was cut at face of 4 room, 1 cross entry left, 4 right north entry, at a point N. 47° E., 1,850 feet from the hoisting shaft. Section B (sample 32071) was cut at face of main north entry, 5 left, at a point N. 30° E., 2,100 feet from the hoisting shaft. Section C (sample 32072) was cut at face of 4 right south air course, at a point S. 70° W., 1,400 feet from the hoisting shaft. Section D (sample 32073) was cut at room neck, 30 feet outby face of 4 left south entry, at a point S. 25° W., 1,500 feet from the hoisting shaft.

The ultimate analysis of a composite sample made by combining face samples 32070 to 32073 is given under laboratory No. 32074.

System of mining, room and pillar. In 1919 the coal was sheared by hand along rib and shot down with a permissible explosive by the miners at 4 p. m. Men employed numbered 106 underground and 16 above ground. Haulage was by mule and storage-battery locomotive. The tippie was of wood, equipped with bar screens; 80 per cent of the coal passed through screens; the washery had one revolving screen with ½-inch round holes; maximum size washed, under 3 inches; sizes produced by washing, nut and pea, blacksmith ¼ inch and less. Average daily tonnage, 200 tons washed. There were two loading tracks, with capacity for 20 empty and 20 loaded railroad cars. The daily capacity of the mine at time of sampling was 1,000 tons, the actual average 275 tons, and the maximum day's run 325 tons. All the coal was taken out in the advance work, and 75 per cent recovery was claimed.

PALOS. BESSIE MINE.

Analyses 26900 to 26903 and 26914 to 26917 (p. 18). Bituminous coal, Warrior field, from Bessie mine, a slope mine 2 miles east of Palos, Ala., on the San Francisco & Southern R. R. Coal bed, Mary Lee; Carboniferous age, Pottsville group. Bed is 8 to 9 feet thick; dips 3° S. E., with cleat in same direction; one fault; no rolls or horsebacks; shale partings; roof, good coal and shale; floor, smooth, hard shale. The bed was sampled by E. B. Sutton on December 4, 1916, as described below.

Sections of coal bed in Bessie mine.

Section.....	A. 26902	B. 26901	C. 26900	D. 26916	E. 26915	F. 26914
Laboratory No.....						
Roof, coal:	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 7½	1 9	1 9	1 8	1 7	1 9
Shale.....	a 2½	a 1	a 2	a 1	a 1½	a ¾
Coal.....	4½	5	4	5½	4	5
Shale.....	a 1 10					
Shale.....		a 1 2	a 1 9	a 1 6	a 1 4	a 1 8
Coal.....	2 6½	2 9½	2 9	2 6½	2 7	2 6
Shale.....	a 1½	a 2	a 2½	a 1½	a 1	a 1½
Coal.....	7	9	8	8	7½	7
Shale.....	a 3	a 2	a 3	a 2	a 1¾	a 2½
Coal.....	8	11½	11	10	9½	9½
Floor, shale:						
Thickness of bed.....	8 2½	8 3	8 9½	8 ¾	7 7	8 1½
Thickness of coal sampled.....	5 9½	6 8	6 5	6 2	5 10¼	6 ½

a Not included in sample.

Section A (sample 26902) was cut at face of 11-12 room, 18 left entry, 5,800 feet northeast of mine opening; section B (sample 26901) was cut at face of 27-28 room, 14 right entry, 5,000 feet southwest of mine opening, section C (sample 26900) was cut at face of 25-26 room, 15 right entry, 5,700 feet southwest of mine opening; section D (sample 26916) was cut at face of 10 right entry; section E (sample 26915) was cut at face of 28 room, 9 left entry; section F (sample 26914) was cut at face of 2 room, 10 left entry.

The ultimate analyses of composite samples made by combining face samples 26914 to 26916 and samples 26900 to 26902 are given under laboratory Nos. 26917 and 26903, respectively.

System of mining, room and pillar. In 1916, in the advance work, 45 per cent of the coal was taken out. Haulage was by mules and hoisting engine. The coal was cut by machine and shot down by the miners with permissible explosive at any time during the shift. Men employed numbered 250 underground and 30 above ground. The coal was dumped over a wooden tippie; all was crushed, washed, and shipped to coke ovens. In 1916 the mine had a capacity of 2,500 tons a day; the daily average output was 1,800 tons, but was expected to reach 2,500 tons.

SHELBY COUNTY.

ALDRICH. ALDRICH MINE.

Analyses 26730 to 26734 (p. 19). Bituminous coal, Cahaba field, from Aldrich mine, opened by a slope, at Aldrich, on the Southern R. R. Coal bed, Montevallo; Carboniferous age, Pottsville group. Bed is 3 feet 6 inches to 4 feet 6 inches thick; contains rock and "rash" partings. Dip is variable. One fault and a few rolls or horsebacks are encountered. Roof, fairly good sandstone; floor, smooth fire clay. The bed was sampled by E. B. Sutton on October 18 and 19, 1916, as described below:

Sections of coal bed in Aldrich mine.

Section..... Laboratory No.....	A. 26732	B. 26731	C. 26730	D. 26733
Roof (main), sandstone and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Shale.....	<i>a</i> 1			
"Rash".....	<i>a</i> 7½	<i>a</i> 5	<i>a</i> 9½	<i>a</i> 8½
Coal.....	1 7½	2 0	2 5½	2 3
"Rash".....	<i>a</i> 2	<i>a</i> 5½		<i>a</i> 1½
"Rash" and shale.....			<i>a</i> 8	
Shale.....	<i>a</i> 2	<i>a</i> 3½		<i>a</i> 1½
Coal.....	<i>a</i> 5½		2	<i>a</i> 1
Shale.....	<i>a</i> 4½			<i>a</i> 4
"Rash".....		<i>a</i> 3		
Coal.....	4½	4		7½
Floor, fire clay.				
Thickness of bed.....	3 9½	3 9	4 1	4 3
Thickness of coal sampled.....	2 0	2 4	2 7½	2 10½

a Not included in sample.

Section A (sample 26732) was cut from 1 panel. Section B (sample 26731) was cut from 6 panel. Section C (sample 26730) was cut from 9 panel. Section D (sample 26733) was cut from 2 panel.

The ultimate analysis of a composite sample made by combining samples 26730 to 26733 is shown under laboratory No. 26734.

System of mining, longwall. In 1916, 100 per cent of the coal was mined in the advance work. Haulage was by three electric locomotives. There was one loading track, with capacity for 15 empty and 30 loaded railroad cars. The coal was cut by machine and shot down with permissible explosive by the miners at any time during the shift; dynamite was used for brushing roof or floor. Men employed numbered 219 underground and 59 aboveground. The coal was dumped over a wooden tippie and screened over shaking screens 5 by 30 feet and 3 by 10 feet, having 2½-inch, 1½-inch, and ¾-inch holes, respectively; coal was cleaned by two pickers on the screens and then washed; appearance of lump coal and screenings on cars, very good. The capacity and daily average output of the mine in 1916 was 600 tons. The lifetime of the mine was estimated at 50 years.

For description and other analyses of this coal see Bureau of Mines Bull. 22, pp. 38, 348.

HELENA. EUREKA NO. 2 MINE.

Analyses 25543 to 25546 (p. 19). Bituminous coal, Cahaba field, from Eureka No. 2 mine, a slope mine 2½ miles southwest of Helena, on the Atlanta, Birmingham & Atlantic R. R. and the Louisville & Nashville R. R. Coal bed, Helena; Carboniferous age, Pottsville group. Bed is about 3½ feet thick; dips 0° to 90°; direction of dip, S. 57° E. Roof, fairly good shale; floor, shale and sandstone, hard, with smooth surface. The bed was sampled by E. B. Sutton on June 24, 1916, as described below:

Sections of coal bed in Eureka mine.

Section.....	A.	B.	C.
Laboratory No.....	25545	25543	25544
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 1	2 2½	3 9
Shale.....	a 1¾	a 1	
Coal.....	1 5	1 3	
Floor, shale.			
Thickness of bed.....	3 7¾	3 6½	3 9
Thickness of coal sampled.....	3 6	3 5½	3 9

a Not included in sample.

Section A (sample 25545) was taken from face, 30 room, opposite 8 right cross-heading. Section B (sample 25543) was taken from 7 right air course, between rooms 19 and 20. Section C (sample 25544) was taken from face, 22 room, off 6 left, 3,300 feet northeast of pit mouth.

The ultimate analysis of a composite sample made by combining face samples 25543 to 25545 is given under laboratory No. 25546.

System of mining, room and pillar. In 1916 the coal was shot off the solid. The vertical depth to landings below entrance is about 1,500 feet. Output was 550 tons a day. Forty to 60 per cent of the coal was taken in advance work. The probable lifetime of the mine was 5 years. In May, 1919, the output of the mine was 250 tons a day, all robbing work, retreating. The probable life was estimated to be 3 years.

MAYLENE. MAYLENE MINE.

Analyses 26301 to 26305 (p. 19). Bituminous coal, Cahaba field, from Maylene mine, a slope mine 1½ miles south of Maylene station, on the Southern R. R. Coal bed, Maylene; Carboniferous age, Pottsville group. Bed is 1 foot 6 inches to 2 feet 8 inches thick; dips 18° to basin; roof, shale, from a few inches to 10 feet thick, over which is sandstone; the shale is easily held up; floor, shale, 3 to 8 inches thick, smooth surface; no cleat; one bounding fault and frequent rolls or horsebacks are encountered. The Upper Maylene bed is only 15 inches thick and is not workable. Interval between the Upper Maylene and the Maylene seam is 8 to 16 feet. The bed was sampled by E. B. Sutton on October 11, 1916, as described below:

Sections of coal bed in Maylene mine.

Section.....	A.	B.	C.	D.
Laboratory No.....	26301	26302	26303	26304
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
"Rash".....	a 6½	a 5	a 8½	a 7
Coal.....	1 11	2' 8	2 3	2 4½
Shale.....	a 4½	a 4	a 3	a 3
Coal.....	a 5	a(?) 5	a(?) 5	a 5
Floor shale.				
Thickness of bed.....	3 3	3 10	3 7½	3 7½
Thickness of coal sampled.....	1 11	2 8	2 3	2 4½

a Not included in sample.

Section A (sample 26301) was cut at face of G heading. Section B (sample 26302) was cut at face of 19 west entry. Section C (sample 26303) was cut at face of 11 room, 15 east heading. Section D (sample 26304) was cut at face of 21 room, 12 west heading.

The ultimate analysis of a composite sample made by combining face samples 26301 to 26304 is given under laboratory No. 26305.

System of mining, longwall; mining is done in the bottom of the seam. In 1916 the coal was undercut by machines in parts of the mine, in the shale band beneath the coal seam and in the band of coal beneath the shale band. All of the coal was taken in advance work; little timbering was required. The coal was shot down with FF black powder. The daily average output at time of sampling was 125 tons. About 1,200 acres remained to be mined from this opening.

For description and other analyses of this coal, see Bureau of Mines Bull. 22, pp. 39, 351.

ALASKA.

ARCTIC COAST.

Analysis 26371 (p. 19). Subbituminous coal from Arctic coast, near Wainright Inlet. Outcrop of a bed, not named; Upper Jurassic (?) age. Data on sampling are not available.

INNOKO DISTRICT.

Analysis 26370 (p. 19). Anthracite, from Tramway, Innoko district. Outcrop of a bed, not named; Upper Cretaceous age, unnamed formation. Data on sampling are not available.

MATANUSKA FIELD.

CHICKALOON RIVER DISTRICT.

CHICKALOON.

Analysis 30265 (p. 19). Washed Chickaloon coal, Matanuska field. The sample was collected by G. W. Evans from 120 sacks of washed Chickaloon coal, coked at Wilkenson, Wash., on February 6 to 8, 1918.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 22, pp. 45, 372; Bull. 85, pp. 22, 157; Bull. 123, pp. 24, 149.

EMERY. KELLY MINE.

Analyses 28731 and 28732 (p. 19). Bituminous coal, Matanuska field, from Kelly mine, at Emery, in sec. 16, T. 19 N., R. 3 E. Coal bed, Kelly; Eocene age, Chickaloon formation. Average thickness of bed, 3 feet 1 inch; dips 27° north; roof, shale and bone; floor, shale and carbonaceous shale; cover at points of sampling, 65 to 75 feet. The bed was sampled by G. W. Evans on May 10, 1917, as described below:

Sections of coal bed in Kelly mine.

Section.....	A. 28731	B. 28732
Laboratory No.....		
Roof, shale and bone.		
Coal.....	<i>Ft. in.</i> 2 10	<i>Ft. in.</i> 1 0
Shale.....		½
Coal.....		2 5
Floor, shale and carbonaceous shale.		
Total thickness of bed.....	2 10	3 5½
Thickness of coal sampled.....	2 10	3 5½

Section A (sample 28731) was taken in 1 chute in a drift driven at a point about 80 feet west of the entrance, at an elevation of 955 feet above sea level. This coal bed is the upper bench of Kelly bed. Section B (sample 28732) was taken from 1 chute in a drift driven in lower bench of Kelly bed at a point about 75 feet west of entrance.

Because of faults encountered the mine was practically closed, the pillars being withdrawn. The coal was partly used for steaming purposes on the Government railroad and partly for domestic use at Anchorage. The daily output at time of sampling was 10 tons.

ESKA CREEK DISTRICT.

ESKA. DAVID MINE.

Analyses 28733 (p. 20). Bituminous coal, Matanuska field, from David mine, at Eska, in sec. 16, T. 19 N., R. 3 E., on the Alaskan R. R. Coal bed, David; Eocene age, Chickaloon formation. Bed is 2 feet 7 inches thick; dips 30° north; roof, shale and bone; floor, bone and carbonaceous shale; cover at point of sampling, about 60 feet; elevation above sea level, 955 feet. The bed was sampled by G. W. Evans on May 11, 1917, as described below:

Section of coal bed in David mine.

	Ft.	in.
Roof, shale and bone.		
Bone ^a		2
Coal.....	1	6
Shale ^a		1
Coal.....		10
Floor, shale and bone.		
Thickness of bed.....	2	7
Thickness of coal sampled.....	2	4

Sample taken from 2 chute, 75 feet from entrance.

System of mining, breast and pillar; coal shot off the solid. The output was used as fuel on the Government railroad and for domestic use at Anchorage. At the time the sample was taken pillars were being withdrawn and the mine was practically abandoned.

ESKA. EMERY MINE.

Analysis 28735 (p. 20). Bituminous coal, Matanuska field, from Emery mine, in sec. 16, T. 19 N., R. 3 E., on the Alaskan R. R. Coal bed, Emory; Eocene age, Chickaloon formation. Bed is 3 feet 10 inches thick; dips 28°; roof, coal and bone; floor, gray shale; cover at point of sampling, 60 feet. The bed was sampled by G. W. Evans on May 11, 1917, as described below:

Section of coal bed in Emory mine.

	Ft.	in.
Roof, coal and bone.		
Coal, with a few nodules.....	2	0
Coal, with some bone.....		8
Shale, brown ^a		2
Bone ^a	1	0
Floor, gray shale.		
Thickness of bed.....	3	10
Thickness of coal sampled.....	2	8

This sample was taken from 1 chute, 60 feet from entrance.

The bed had been virtually exhausted in the area lying between mine entrance and faults encountered about 300 feet in. The coal was used mainly for steam fuel on the Government railroad and for domestic use at Anchorage.

^a Not included in sample.

ESKA. ESKA MINE.

Analysis 28734 (p. 20). Bituminous coal, Matanuska field, from Eska mine, located at Eska, in sec. 16, T. 19 N., R. 3 E., on the Alaskan R. R. Coal bed, Eska; Eocene age, Chickaloon formation. Bed is 2 feet 10 inches thick; dips 25°; roof, shale; floor, shale and bone; cover at point of sampling, 20 feet; elevation above sea level, 990 feet. The bed was sampled at 1 chute by G. W. Evans on May 11, 1917, the sample representing 2 feet 10 inches of coal.

At the time of sampling a gangway was driven in 25 feet and one chute turned off. Daily output, 15 tons.

ESKA. McCAULEY PROSPECT.

Analysis 28836 (p. 20). Bituminous coal, Matanuska field, from McCauley prospect, in sec. 10, T. 19 N., R. 3 E., an outcrop on the hillside about 1½ miles northeast of present operations at Eska Creek, in the Matanuska coal field, on the Alaskan R. R. Coal bed, McCauley; Eocene age, Chickaloon formation. Bed is 6 feet 8 inches thick; dips 14° southwest; roof and floor concealed; elevation above sea level, about 1,600 feet. The bed was sampled at one point in face of prospect by G. W. Evans on May 16, 1917, the sample representing 9 feet 8 inches.

At the time of sampling no work other than surface prospecting had been done.

ESKA. MAITLAND MINE.

Analyses 28736 and 28737 (p. 20). Bituminous coal, Matanuska field, from Maitland mine, at Eska, in sec. 16, T. 19 N., R. 3 E., on the Alaskan R. R. Coal bed, Maitland; Eocene age, Chickaloon formation. Bed is 2 feet 10 inches thick; dips 4° to 30°; roof, bone and shale; floor, shale; cover at point of sampling, about 50 feet; elevation above sea level, 979 feet. The bed was sampled at one point at the second plane or chute by G. W. Evans on May 10, 1917, the sample representing 2 feet 10 inches of coal. Sample 28737 represents a grab sample taken from the surface of a loaded railroad car.

System of mining, room and plane, but at time of sampling no systematic method had been developed. The coal was shot off the solid. Bed has many rolls, horsebacks, and other disturbances. Men employed numbered 15 underground and 5 above ground. The tipple is of wood. At time of sampling the output was 25 tons a day, 30 per cent of which was from advance workings. Haulage was by man power. There was one loading track, with capacity for four empty and three loaded railroad cars. Appearance of coal on cars was very good. The daily capacity of the mine was 30 tons; entire output was shipped as run of mine for locomotive use on the railway and for domestic use at Anchorage.

UPPER ESKA CREEK. OUTCROP.

Analysis 29362 (p. 20), sample of bituminous coal, Matanuska field. The sample was taken by S. S. Smith on September 6, 1917, from an outcrop on the west bank of the west fork of the middle fork near the north boundary of sec. 9, T. 19 N., R. 3 E.

There were no mine workings or any prospective workings.

MOOSE CREEK DISTRICT.

MOOSE CREEK. DOHERTY MINE.

Analyses 28729 and 28730 (p. 20). Bituminous coal, Matanuska field, from Doherty mine, a slope mine at Moose Creek, on a branch connecting with the Matanuska division of the Government railroad in Alaska. Coal bed, Doherty; Eocene age, Chickaloon formation; bed dips 46°; roof, sandstone; floor, shale. Two samples of this coal were obtained by G. W. Evans on May 12, 1917. Sample 28729 is of screenings through a ½-inch screen, mostly of the friable shale near the floor of this bed. It was collected

on the surface at the small cleaning plant. Sample 28730 was taken at intervals along the surface of a pile of coal in the bunkers at the end of the tramroad connecting with the Government railroad.

The daily output at time of sampling was 110 tons.

MOOSE CREEK. OUTCROP.

Analysis 28837 (p. 20), sample of bituminous coal, Matanuska field. This sample was taken by S. S. Smith on September 6, 1917, from a bed on east bank of Moose Creek, opposite property of Doherty Coal Co., which is about 3,000 feet up Moose Creek from railroad right of way.

The bed dips 45° south, and ranges between 4 and 5 feet in thickness. The sample represents only 18 to 24 inches of the bed, as the rest was full of bone and dirt. No further information available.

NENANA FIELD.

CALIFORNIA CREEK. OUTCROP.

Analysis 26359 (p. 21). Lignite, Nenana field, from surface outcrop in a bluff on the east bank of California Creek, cut and quartered from partly cleaned weathered face. Coal bed, not named; Tertiary (Eocene) age. The bed was sampled by G. C. Martin on July 3, 1916, as described below:

Section near SE. corner of SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 15, T. 9 S., R. 6 W.

Roof, not exposed.

Concealed. ^a	Ft. in.
Coal.....	6 6
Coal ^a	4 0
Concealed. ^a	

Floor, not exposed.

Thickness of bed.....	10 6
Thickness of coal sampled.....	6 6

Much baked clay, probably from burning of large beds, was seen at altitudes of 1,400 to 1,650 feet in the NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ and NE. $\frac{1}{4}$, on both sides of the stream that enters California Creek from the southeast in the SE. $\frac{1}{4}$, and at 1,900 feet near the northwest corner of the section.

CALIFORNIA CREEK. OUTCROP.

Analyses 26360 and 26361 (p. 21). Lignite, Nenana field, from cliff on east bank of California Creek, cut and quartered from partly cleaned weathered face. Coal bed, not named; Tertiary age. Bed dips 10° to 15° southeast; strikes north 60° to 70° east. The bed was sampled by G. C. Martin on July 16, 1916, as described below:

Section of cliff on E. side of California Creek in SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 27, T. 10 S., R. 6 W.

Laboratory No.....	26360	26361
Section.....	A.	B.
Roof, not stated.	<i>Ft. in.</i>	<i>Ft. in.</i>
Gravel ^a		
Coal.....	^a 12 0	12 0
Clay.....	^a 8	^a 8
Coal.....	6 6	^a 6 6
Clay.....	^a 1 6	^a 1 6
Floor, not stated.		
Thickness of bed.....	20 8	20 8
Thickness of coal sampled.....	6 6	12 0

^a Not included in sample.

HEALY CREEK. OUTCROP.

Analysis 26368 (p. 21). Lignite, Nenana field, from outcrop on north bank of Healy Creek, about 1 mile above mouth. Coal bed, not named; Tertiary (Eocene) age. The bed was sampled by G. C. Martin on August 19, 1916, as described below:

Section on N. bank of Healy Creek, 1 mile above mouth.

Roof, not stated.	Feet.
Coal.....	6
Coal ^a	6±
Floor, not stated.	
Thickness of bed.....	12±
Thickness of coal sampled.....	6

LIGNITE CREEK. OUTCROP.

Analysis 26362 (p. 21). Lignite, Nenana field, from cliff on north bank of Lignite Creek; represents selection of less weathered pieces throughout the bed. Coal bed, B; Tertiary (Eocene) age. The bed was sampled by G. C. Martin on August 11, 1916, as described below:

Section of N. bank of Lignite Creek in SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 30, T. 11 S., R. 6 W., altitude 1,650 feet.

Roof, not stated.	Ft.	in.
Coal.....	7	0
Clay ^a		6
Coal.....	12	0
Clay ^a	1	0
Coal.....	7	0
Floor, not stated.		
Thickness of bed.....	27	6
Thickness of coal sampled.....	26	0

LIGNITE CREEK. OUTCROP.

Analysis 26363 (p. 21). Lignite, Nenana field, from west side of Fault Gulch, Lignite Creek (upper thick bed), in the NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 26, T. 11 S., R. 6 W.; selection of least-weathered parts of outcrop. Coal bed, not named; Tertiary (Eocene) age; dips 26° north; strikes, north 80° west. The bed was sampled by G. C. Martin on August 11, 1916. The sample represented 16 feet of coal, the exposed thickness of the bed. Roof and floor not recorded.

LIGNITE CREEK. OUTCROP.

Analysis 26364 (p. 21). Lignite, Nenana field, from gulch tributary to Lignite Creek, from the north $\frac{1}{4}$ mile northeast of the southwest corner of sec. 26, T. 11 S., R. 6 W., cut from partly cleaned outcrop. Coal bed, not named; Tertiary (Eocene) age. The bed was sampled by G. C. Martin on August 12, 1916. The sample represented 12 feet of coal, the exposed thickness of the bed. Roof and floor not recorded.

LIGNITE CREEK. CLIFF FACE.

Analysis 26365 (p. 21). Lignite, Nenana field, from bank of Lignite Creek 15/100 mile north of southeast corner of section 26, cut from fresh cliff face. Coal bed, not named; Tertiary (Eocene) age. The bed was sampled by G. C. Martin on August 12, 1916. The sample represented 10 feet of coal, which was the exposed thickness of the bed. Roof and floor not recorded.

^a Not included in sample.

LIGNITE CREEK. OUTCROP.

Analysis 26366 (p. 21). Lignite, Nenana field, from tributary of Lignite Creek draining section 27 about 500 feet, in NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 27, T. 11 S., R. 6 W., cut from natural exposure. Coal bed, not named; Tertiary (Eocene) age. Dips 15° north (?); strikes north 70° east. The bed was sampled by G. C. Martin on August 8, 1916. The sample represented 25 feet of coal, which was the exposed thickness of the bed. Roof and floor not recorded.

LIGNITE CREEK. OUTCROP.

Analysis 26367 (p. 22). Lignite, Nenana field, from bluff on north bank of Lignite Creek about 1 mile above mouth, in NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 5, T. 12 S., R. 7 W., cut from least-weathered parts of natural exposure. Coal bed, not named; Tertiary (Eocene) age; dips 12° south; strikes north 105° east. The bed was sampled by G. C. Martin on August 18, 1916, as described below:

Section of coal bed in Lignite Creek outcrop.

Roof, not stated.	Feet.
Coal ^a	8±
Coal	7
Floor, not stated.	
Thickness of bed	15±
Thickness of coal sampled	7

LIGNITE CREEK. OUTCROP.

Analysis 26369 (p. 23). Lignite, Nenana field, from outcrop on first large gulch from northwest to large stream entering Lignite Creek, in NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 35, T. 11 S., R. 7 W. Coal bed, not named; Tertiary (Eocene) age. The bed was sampled by G. C. Martin on August 20, 1916, as described below:

Section of coal bed in Lignite Creek outcrop.

Roof, not stated.	Ft. in.
Coal	12 0
Clay ^a	6
Coal	6 0
Clay ^a	6
Coal	11 0
Floor, not stated.	
Thickness of bed	30 0
Thickness of coal sampled	29 0

LIGNITE CREEK. PROSPECT.

Analyses 26588 and 26589 (p. 24). Lignite, Nenana field. The samples were taken by G. W. Evans on September 15, 1916, at outcrop of Nos. 5 and 1 coal beds on the north side of Lignite Creek, about 6 miles from the point at which this creek empties into Nenana River. Coal beds 5 and 1; Eocene age. Sample 26588 represents an 8-foot section cut from No. 5 bed, which is uniform and is 30 feet thick. Sample 26589 represents an 8-foot section from No. 1 bed, which is 45 to 50 feet thick. Bed dips 6° ; roof, sandstone; floor, clay; height above sea level, about 2,000 feet. No work has been done on these outcrops; they are the result of natural erosion.

^a Not included in sample.

ARKANSAS.

FRANKLIN COUNTY.

ALIX. No. 2 MINE.

Analyses 69641, 69643, 69644, average of mine-face samples; analysis 69642, average of tipple samples; analysis 69645, of slack through $1\frac{1}{8}$ -inch bar screen, and analyses 69640 and 69646, of lump over $1\frac{1}{8}$ -inch bar screen (p. 22). Bituminous coal taken from face and from tipple, Arkansas field, of No. 2 mine, a shaft mine 1 mile east of Alix, on the Missouri Pacific R. R. Coal bed, locally known as Denning; Carboniferous (Allegheny) age; Spadra shale. Bed is 4 feet $\frac{1}{2}$ inch to 4 feet $9\frac{1}{2}$ inches thick at sections where face samples were taken; these measurements include middle band; dip, 5 per cent northwest; roof, shale; floor, shale. The bed was sampled by J. F. Davies on June 28, 1918, as described below:

Sections of coal bed in No. 2 mine.

Section..... Laboratory No.....	A. 69641	B. 69643	C. 69644
Roof, shale:	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 $8\frac{3}{4}$	1 $7\frac{1}{2}$	1 $8\frac{1}{4}$
Muck.....	^a $6\frac{1}{4}$	$4\frac{1}{2}$	
Shale.....			^a 10
Coal.....	1 5	2 $\frac{1}{2}$	2 $3\frac{1}{4}$
"Sulphur".....	$a\frac{1}{2}$		
Coal.....	$5\frac{3}{4}$		
Floor, shale:			
Thickness of bed.....	4 $2\frac{3}{4}$	4 $\frac{1}{2}$	4 $9\frac{1}{2}$
Thickness of coal sampled.....	3 $7\frac{1}{2}$	3 8	3 $11\frac{1}{2}$

^a Not included in sample.

Section A (sample 69641) was cut at 9 room in 3 west plane. Section B (sample 69643) was cut at 3 room in 1 east plane. Section C (sample 69644) was cut at face of 1 east slope.

System of mining, room and pillar. At time of sampling coal was shot down with black blasting powder and no mining machines were used. Men employed numbered 23 underground and 4 on the surface. Coal was dumped from self-dumping cages over wooden tipple and screened over $1\frac{1}{8}$ -inch openings in bar screens, producing slack and lump sizes. One picker on railroad cars; miners were said to pick the coal when loading it at the face. Fifty per cent of the coal was mined in advance work, and a total recovery of 60 per cent was claimed. Haulage was by mules. Two loading tracks, with capacity for 20 empty and 16 loaded railroad cars. At time of sampling the coal was shipped principally to Little Rock and Kansas City, Mo., for steaming purposes. Forty to 45 per cent of the coal was shipped as slack through $1\frac{1}{8}$ -inch bar screens. The capacity of the mine was 475 tons a day, and average daily output at time of sampling was 80 to 100 tons. The mine was about worked out.

SEBASTIAN COUNTY.

BONANZA. WOODSON BARR OR No. 135 MINE.

Analyses 69378, 69379, 69397, average of mine-face samples, and analyses 69374 to 69377, average of tipple samples (p. 22). Semianthracite (?) coal taken from face and tipple, Arkansas field, from Woodson Bar or No. 135 mine, a slope mine 3 miles east of Bonanza, on a spur of the St. Louis & San Francisco R. R. Coal bed, Upper Hartshorne; Carboniferous (Allegheny) age, Spadra shale. Bed is 4 feet to 6 feet 6 inches thick; dip, 8 per cent north; roof, shale; floor, hard rock. The bed was sampled by N. H. Snyder and J. F. Davies on June 8, 1918, as described below:

Sections of coal bed in Woodson Barr or No. 135 mine.

Section..... Laboratory No.....	A. 69378	B. 69379	C. 69397
Roof, shale:	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 7 $\frac{1}{2}$	2 $\frac{1}{4}$	2 7
"Sulphur".....	a 1 $\frac{1}{2}$		
Coal.....	7 $\frac{1}{2}$		
Shale.....	a 1 $\frac{1}{2}$	a 2	a 2
Coal.....	1 6 $\frac{1}{2}$	1 2 $\frac{1}{2}$	1 1 $\frac{1}{4}$
Thickness of bed.....	4 $\frac{3}{4}$	3 4 $\frac{3}{4}$	3 10 $\frac{1}{4}$
Thickness of coal sampled.....	3 9 $\frac{1}{4}$	3 2 $\frac{3}{4}$	3 8 $\frac{1}{4}$

^a Not included in sample.

Section A (sample 69378) was cut in 51 room, 7 west main entry, 4,000 feet from slope opening. Section B (sample 69379) was cut in 1 room, at face of 19 east entry. Section C (sample 69397) was cut in room neck of last room, at face of 9 west entry.

System of mining, room and pillar. In 1918 the coal was shot down with black blasting powder and the mining was done by hand. Men employed numbered 95 underground and 10 on the surface. The coal was dumped on a crossover dump and passed over bar screens; two sizes were produced, as follows: Slack, through 1 $\frac{1}{8}$ -inch bar screen, 40 to 47 per cent of entire tonnage; lump, over 1 $\frac{1}{8}$ -inch bar screen, 53 to 60 per cent of entire tonnage. At times one picker was employed on the railroad cars; miners pick out some slate when loading coal at face. About 50 per cent of the coal was taken out in advance work, and a total recovery of 60 per cent was claimed. Haulage was by mules. The two loading tracks had capacity for 20 empty and 20 loaded railroad cars. The coal was shipped to Kansas City, Omaha, and to the St. Louis & San Francisco R. R. for domestic and railroad use. The capacity and average daily output of the mine in June, 1918, was 375 tons.

HARTFORD. CENTRAL No. 10 MINE.

Analysis 29838, average of tipple samples; analyses 69619 to 69624 and 69628 and 69631 (p. 23). Semibituminous, Arkansas field, from Central No. 10 mine, a slope mine at Hartford, on the Chicago, Rock Island & Pacific R. R. Coal bed, Hartshorne; Carboniferous age, Spadra shale. Bed is 3 to 4 feet thick and dips 4°. Frequent faults and occasional rolls or horsebacks are encountered. Bed contains thin "sulphur" bands, usually near the middle. Roof, mostly hard gray sandstone; floor, hard rough gray shale. The bed was sampled by W. H. McCoubrey on January 12, 1918, as described below. Commercial samples were taken at the tipple by J. F. Davies and N. H. Snyder on June 26, 1918.

Sections of coal bed in Central No. 10 mine.

Section..... Laboratory No.....	A. 29835	B. 29836	C. 29837
Roof, main, hard gray sandstone; immediate, soft gray shale:	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....	3 9	4 1	3 11
Middle band of soft shale.....	a 8		a 7
Middle band of soft fire clay.....		a 7	
Bottom coal (poor grade).....	7	8	12
Thickness of bed.....	5 0	5 4	5 6
Thickness of coal sampled.....	4 4	4 9	4 11

^a Not included in sample.

Section A (sample 29835) was taken from face of 4 south entry. Section B (sample 29836) was taken from face of 2 south entry. Section C (sample 29837) was taken from face of 3 north entry.

The ultimate analysis of a composite sample made by combining face samples 29835 to 29837 is given under laboratory No. 29838.

System of mining, double room and pillar. In 1918 coal was cut by machine in the fire clay and shot down with permissible explosives. Men employed numbered 107 underground and 23 above ground. The tippie was of wood. The total output was shipped as run of mine. Haulage was by mules. The coal was picked on the cars by two pickers. There were three loading tracks, with capacity for 30 empty and 30 loaded railroad cars. The appearance of the lump coal on the cars was good. The capacity of the mine in January, 1918, was 625 tons, the actual daily average 575 tons.

HARTFORD. CENTRAL NO. 11 MINE.

Analyses 69615 and 69620, 69632 and 69633, average of mine-face samples, and analyses 69617 and 69621, 69623 and 69635, average of tippie samples, (p. 23). Bituminous coal taken from face and tippie, Hartford field, from No. 11 mine, a shaft mine $2\frac{1}{2}$ miles northeast of Hartford, on the Midland Valley R. R. Coal bed, Lower Hartshorne, Carboniferous (Allegheny) age, Spadra shale. Bed is 7 feet 4 inches to 8 feet 6 inches thick at sections sampled; dip, 18 per cent; roof, fairly strong and dark shale with "sulphur" bands; floor, soft, smooth shale. The bed was sampled by W. H. McCoubrey on June 25, 1918, as described below. Commercial samples were taken at the tippie on June 25, 1918, by J. F. Davies and N. H. Snyder.

Sections of coal bed in No. 11 mine.

Section..... Laboratory No.....	A. 69615	B. 69620	C. 69632	D. 69633
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, not noted:				
Bony coal.....	1 2	6 $\frac{1}{2}$		
Coal.....	2 $\frac{1}{2}$	1 7	1 9	1 7 $\frac{1}{2}$
Shale band.....	1 $\frac{1}{8}$	1 $\frac{1}{8}$	4 $\frac{1}{4}$	1 $\frac{1}{8}$
Coal.....	1 4	3 1 $\frac{1}{8}$	4	1 $\frac{1}{2}$
Shale band.....	3 $\frac{1}{2}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$	2
Coal.....	7	5 $\frac{1}{2}$	11	11
Shale band.....	1 $\frac{1}{8}$			1
Bony coal.....		4 $\frac{1}{4}$	1 $\frac{1}{8}$	
Coal.....	1	5 $\frac{1}{2}$	11 $\frac{1}{2}$	10 $\frac{1}{2}$
"Sulphur" band.....	1 $\frac{1}{8}$	1 $\frac{1}{8}$		
Bony coal.....			9	4
Coal.....	9 $\frac{1}{2}$	4	6	
Bony coal.....	6 $\frac{1}{2}$		2 $\frac{1}{2}$	8 $\frac{1}{2}$
Shale and "sulphur" band.....	8	3 $\frac{3}{4}$		
Coal.....		1 1 $\frac{1}{2}$	2 1 $\frac{1}{2}$	7 $\frac{1}{2}$
Bony coal.....	3	8		
Coal.....	4 $\frac{1}{2}$	3		
Shale band.....	7 $\frac{1}{8}$	1 $\frac{1}{2}$		2 $\frac{1}{2}$
Coal.....	7	4		2 4
"Sulphur" band.....	1 $\frac{1}{2}$	1		
Coal.....	1 8 $\frac{1}{2}$	2 3		
Floor, smooth, soft shale.				
Thickness of bed.....	8 0	8 6	7 4	7 10
Thickness of coal sampled.....	8 0	8 6	7 4	7 10

Section A (sample 69615) was taken at face of 1 east entry, west plane. Section B (sample 69620) was taken at face of 3 east entry, west slope. Section C (sample 69632) was taken at face of 4 east entry, east plane. Section D (sample 69633) was taken at face of 20 room, 2 east entry, east plane.

In 1918, 75 per cent of the coal was mined in the advance work and a total recovery of 90 per cent was claimed. Haulage was by mules, by storage-battery locomotive, and by tail rope. The four loading tracks had capacity for 40 empty and 40 loaded railroad cars.

System of mining, room and pillar, entry and air course. The coal was cut by hand and shot down with black blasting powder. Pieces of bone, "muck," roof, and floor appeared in the coal, but the miners endeavored to pick the coal at the face. Men employed numbered 102 in the mine and 17 men on the surface. Two pickers were employed on the railroad cars, and there was an underground coal inspector. The

mine was equipped with a shaker screen and a loading boom; a picking table was being installed.

The coal was shipped by the Midland Valley R. R. to Omaha, Nebr., for steam purposes. The capacity of the mine was 1,500 tons a day; the average daily output in July, 1918, was 400 tons. Additional labor would increase the tonnage.

HUNTINGTON. CENTRAL No. 6 MINE.

Analyses 27612 to 27617 (p. 23). Semibituminous coal, Arkansas field, from Central No. 6 mine, a shaft mine, Greenwood-Huntington district, on a spur off the Mansfield branch of the St. Louis & San Francisco R. R., in sec. 33, T. 5 N., R. 30 W., Diamond Township, about 3 miles west of Huntington. Coal beds, Upper and Lower Hartshorne, Carboniferous (Allegheny) age, Spadra shale. The beds are separated by a layer of hard shale averaging about 8 inches in thickness and locally called "muck;" the upper seam averages about 4 feet 2 inches in thickness; the lower, 2 feet 2 inches. Roof varies; on the north section a very hard sandstone and on the south a shale that thickens toward the south; floor, soft gray shale. The beds were sampled at five points by J. F. Davies and W. W. Fleming on February 16 and 17, 1917, as described below:

Sections of coal beds in Central No. 6 mine.

Section..... Laboratory No.....	A. 27612	B. 27614	C. 27616	D. 27613	E. 27615
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, clean.....	1 0		2 6		
Bone (hard).....		^a 10			^a 7
"Mother coal".....	$\frac{1}{4}$				
Bone and "rash".....				^a 7 $\frac{1}{2}$	
Coal, clean.....	1 1				
Black "sulphur".....	^a 2 $\frac{1}{2}$		$\frac{1}{4}$		
Coal (with knife edges of "sulphur").....		1 8	8	3 11	3 4 $\frac{1}{2}$
Coal, clean.....	1 5 $\frac{1}{2}$	^a 2			
Coal (with knife edges of "sulphur").....		1 7 $\frac{1}{2}$			
Bone.....	1	^a 4 $\frac{1}{2}$	^a 7		
"Muck".....	^a 9 $\frac{1}{2}$	^a 11	^a 1 10	^a 1 0	^a 10
Bone.....	^a 2 $\frac{1}{2}$				
Bone and "muck".....			^a 5 $\frac{1}{2}$		
"Muck".....			^a 2 $\frac{1}{2}$		
Coal, clean.....	4 $\frac{1}{2}$	6	2 0	6	7
"Muck".....	^a 3 $\frac{1}{2}$	^a 3		^a 3	
"Muck" and bone.....					^a 6
Coal, clean.....	5 $\frac{1}{2}$				1 10 $\frac{1}{2}$
"Sulphur" band.....	^a 2				
Coal (with knife edges of "sulphur").....		2 3		2 4 $\frac{1}{2}$	
Coal.....	1 4				
Floor, soft gray shale.					
Thickness of bed.....	7 5 $\frac{3}{4}$	8 7	8 3 $\frac{1}{4}$	8 8	7 9
Thickness of coal sampled.....	5 9 $\frac{1}{4}$	6 $\frac{1}{2}$	5 2 $\frac{1}{4}$	6 9 $\frac{1}{2}$	5 10

^a Not included in sample.

Section A (sample 27612) was taken from neck room 8, 5 north off 2 east entry. Section B (sample 27614) was taken from 21 room neck, 1 west south. Section C (sample 27616) was taken from 1 room, off back 4 east on main north. Section D (sample 27613) was taken at junction 6 east and back entry of south-east. Section E (sample 27615) was taken at 19 room 2 east off main south.

The ultimate analysis of a composite sample made by combining samples 27612 to 27616 is shown under laboratory No. 27617.

System of mining, double entry, entry and air course, room and pillar. In 1917 the coal was shot from the solid with FF black blasting powder. The tippie was of wood with shaker screens measuring 20 by 8 feet, making three sizes of coal; the diameters of the holes were $\frac{1}{2}$ inch, $1\frac{1}{4}$ inch, and 2 inch. About 20 per cent of the output was shipped as run of mine. Haulage was by mules, electric locomotives, and electric hoists. The average daily output was 1,200 tons.

HUNTINGTON. CENTRAL NO. 6 MINE.

Analyses 69329 to 69334, average of mine-face samples, and analyses 69339, 69357, 69358, 69359, and 69360 to 69363, average of tipple samples (p. 23). Tipple samples of semibituminous coal, Huntington field, from No. 6 mine, a shaft mine 3 miles west of Huntington, on Frisco R. R. Coal beds, Upper and Lower Hartshorne; Carboniferous (Allegheny) age, Spadra shale; roof, slate; floor, black shale. The beds were sampled by N. H. Snyder and J. F. Davies on June 5 and 6, 1918, as described below. Commercial samples were taken at the tipple by G. S. Pope and N. H. Snyder on June 7, 1918.

Sections of coal beds in No. 6 mine.

Section.....	A.	B.	C.
Laboratory No.....	69331 and 69332	69329 and 69330	69333 and 69334
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 5	2 1 $\frac{1}{4}$	3 10 $\frac{1}{4}$
Coal, bony.....	2 $\frac{1}{2}$		
Coal.....	5 $\frac{1}{2}$		
"Sulphur".....	a 1	a 1 $\frac{1}{4}$	
Coal.....	5	1 4 $\frac{1}{4}$	
"Sulphur".....	a $\frac{1}{2}$		
Coal.....	1 2		
"Muck".....	a 11 $\frac{1}{2}$	a 10 $\frac{1}{2}$	a 1 1
Coal.....	8 $\frac{1}{4}$	6 $\frac{1}{4}$	5 $\frac{3}{4}$
"Muck".....	a 2 $\frac{1}{4}$	a 4 $\frac{1}{4}$	a 4 $\frac{1}{4}$
Coal.....	2 3 $\frac{1}{2}$	2 1 $\frac{1}{4}$	2 1 $\frac{1}{4}$
Floor, black shale.....			
Thickness of beds.....	7 11	7 6 $\frac{1}{2}$	7 11
Thickness of coal sampled.....	6 7 $\frac{3}{4}$	6 2 $\frac{1}{2}$	6 5 $\frac{3}{4}$

a Not included in sample.

Section A (samples 69331 and 69332) was cut at 28 room, 1 west, main south. Section B (samples 69329 and 69330) was cut at 5 east, main southeast. Section C (samples 69333 and 69334) was cut at heading, main southeast back entry. Samples 69360 and 69363 represented tipple samples of run-of-mine coal; samples 69357 and 69358 represented tipple samples of slack coal over $\frac{3}{4}$ -inch screen, and samples 69339 and 69359 represented tipple samples of slack through $\frac{3}{4}$ -inch screen.

In 1918, 71 per cent of the coal was taken out in the advance work and a total recovery of 80 per cent was claimed.

System of mining, room and pillar, entry and air course. In 1918 machine mining was not practiced; the coal was shot down with black blasting powder; mining machines (electric) were formerly used. Haulage was by mules, motor, and electric rope. The three loading tracks had capacity for 40 empty and 40 loaded railroad cars. Men employed numbered 325 underground and 25 above ground. The coal was dumped over a tipple equipped with modern screens and a loading conveyer boom. Sizes produced were as follows: Slack, dust to 1 inch, 40.55 per cent; nut, 1 inch to 2 $\frac{1}{2}$ inches, 9.47 per cent; lump, 2 $\frac{1}{2}$ inches and over, 50.04 per cent. All screened coal passed over 1 $\frac{1}{4}$ -inch perforated screen, area 80 square feet, and 2-inch perforated screen, area 40 square feet. The screened coal was not reassembled. The coal was cleaned by four pickers on the loading boom and three pickers on railroad cars. No coal inspector was employed at the tipple, but two were employed underground. The miner rejected some "muck" and shale in loading coal at the face. The coal was being shipped to Kansas City, Omaha, and to the St. Louis & San Francisco R. R. The capacity of the mine was 1,700 tons a day, and the average daily output at the time the samples were taken was 1,450 tons; the output for the year 1917 was 156,653 tons, the mine being shut down from February 2 to 23, 1917, on account of explosions.

WASHINGTON COUNTY.

FAYETTEVILLE. STANBERY WAGON MINE.

Analysis 26260 (p. 24). Bituminous coal, from Stanbery wagon mine, 5 miles east of Fayetteville. Coal bed, Morrow; Carboniferous age, Morrow formation. Roof, shale, under limestone; floor, clay. The bed was sampled October 9, 1916, by D. White. The samples represented $11\frac{7}{8}$ inches of coal, which was the entire thickness of bed.

The section was measured off second left, about 600 feet from opening of mine.

FAYETTEVILLE. WAGNON & REED WAGON MINE.

Analysis 26259 (p. 24). Bituminous coal, Washington County field, from Wagon & Reed wagon mine, $5\frac{1}{2}$ miles east of Fayetteville. Coal bed, Morrow; Carboniferous age, Morrow formation. Roof, shale; floor, fire clay. The bed was sampled October 9, 1916, by D. White; the sample represented $11\frac{1}{2}$ inches of coal, which was the entire thickness of the bed.

The section was measured in main entry 400 feet from entrance of mine.

CALIFORNIA.

AMADOR COUNTY.

LIGNITE. IONE MINE.

Analyses 31141 and 31168 (p. 24). Lignite coal, Ione field, from Ione mine, a shaft mine at Lignite, 4 miles northwest of Ione, on the Southern Pacific R. R. Coal bed, not named; Tertiary (Eocene) age, Ione formation. Bed is a few inches to 22 feet thick and lies in a basin generally flat; cleat, not observed; general characteristics of of the bed shown in sections sampled; roof, sandy clay; floor, not noted; cover at point sampling, about 80 feet. The bed was sampled by H. M. Wolflin and M. R. Campbell on October 17, 1918, as shown below:

Section of coal bed in Ione mine.

Section.....	A. 31141		B. 31168	
Laboratory No.....				
Lignite.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Clay.....	6	9	<i>a</i> 6	9
Lignite.....	<i>a</i> 1	$5\frac{1}{2}$	1	$5\frac{1}{2}$
Clay.....	<i>a</i> 1	$7\frac{1}{2}$	1	$7\frac{1}{2}$
Lignite.....	<i>a</i> 2	$2\frac{1}{2}$		$2\frac{1}{2}$
Clay.....	<i>a</i> 2	2		2
Lignite.....	<i>a</i> 1	$7\frac{1}{2}$	1	$7\frac{1}{2}$
Thickness of bed.....	11	$11\frac{1}{4}$	11	$11\frac{1}{4}$
Thickness of lignite sampled.....	6	9	5	$2\frac{1}{4}$

a Not included in sample.

Section A (sample 31141) was measured 1,300 feet S. 50° east of shaft. Section B (sample 31168) was measured about 50 feet inby place where sample A was cut.

System of mining, room and pillar. In 1918 probably not more than a dozen men were employed, and the output was probably about 40 tons daily. Haulage was by mules. Coal was lowered from the shaft to the wooden tippie by gravity tram, and there hoisted again to screen and load.

MENDOCINO COUNTY.

DOS RIOS. NATURAL OUTCROP.

Analysis 31139 (p. 25). Subbituminous coal, Dos Rios field, from 4 miles east of Dos Rios, in NE. ¼ sec. 11, T. 21 N., R. 13 W., on the Northwestern Pacific R. R. Coal bed not named; Tertiary (Miocene?) age. Bed is 15 feet 6 inches thick; dip, 15°; no cover at point of sampling; sample was cut from outcrop where it crosses Middle Fork of Eel River. The bed was sampled by M. R. Campbell on October 9, 1919, as described below:

Section of coal bed in outcrop 4 miles east of Dos Rios.

	Ft.	In.
Coal.....	a 1	6
Coal, sampled.....	3	0
Coal.....	a 10	0
Thickness of bed.....	14	6
Thickness of coal sampled.....	3	0

MONTEREY COUNTY.

STONE CANON. STONE CANON MINE.

Analyses 31100 and 31101 (p. 25). Bituminous coal, Stone Canon field, from a slope mine, at Stone Canon in NW. ¼ sec. 14, T. 22 S., R. 13 E., 24 miles from McKay, on the Southern Pacific R. R. Coal bed, not named; Tertiary (Miocene) age; Vaqueros sandstone; dip, 30°; cleat, not observed. In the open part of the mine the bed is fairly regular in thickness and generally without partings, but is said to pinch out in both directions from the slope. Roof, massive sandstone; floor, green clay that has given some trouble where all the coal has been removed; cover at point of sampling, about 500 feet. The bed was sampled by M. R. Campbell on September 30, 1918, as described below:

Section of coal bed in Stone Canon mine.

Section.....	A. 31100	B. 31101
Laboratory No.....		
	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	a 5 7	a 4
Coal.....	5 10	7 6
Coal.....		a 6
Parting.....	a 1	
Bone.....		a 2
Coal.....	1 1	
Coal.....		2 7½
Coal, bony.....	a 6	
Bone.....		a 1½
Coal.....		1 10
Thickness of bed.....	13 1	13 1
Thickness of coal sampled.....	6 11	11 11½

a Not included in sample.

Section A (sample 31100) was measured at face of 1 east entry below the 300-foot level, 300 feet from inside slope and 4,800 feet east of main slope. Section B (sample 31101) was measured at face of 1 west entry below the 300-foot level, 200 feet west of inside slope and 4,300 feet east of main slope.

Mine not worked in a commercial way; only enough coal extracted to keep the mine open and supply the few miners with light.

a Not included in sample.

COLORADO.

BOULDER COUNTY.

BROOMFIELD. MONARCH NO. 2 MINE.

Analyses 31314, 31315, and 31316 (p. 25). Subbituminous coal, Denver region, locally called Northern Lignite field, from Monarch No. 2 mine, a shaft mine 3 miles northwest of Broomfield, in sec. 28, T. 1 S., R. 69 W., on the Colorado & Southern R. R. Coal bed, unnamed, Cretaceous age, Laramie formation. Bed is level and 7 feet thick; roof, shale; floor, shale; cover at points of sampling, 285 feet. The bed was sampled by J. J. Forbes on December 3, 1918, as described below:

Sections of coal bed in Monarch No. 2 mine.

Section.....	A. 31314	B. 31315
Laboratory No.....		
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	5 6	5 6
Shale.....	^a 1 0	^a 2 9
Coal.....	2 4	1 2
Floor, shale.		
Thickness of bed.....	8 10	9 5
Thickness of coal sampled.....	7 10	6 8

^a Not included in sample.

Section A (sample 31314) was cut at face of 7 southwest entry. Section B (sample 31315) was cut at face of main south entry.

The ultimate analysis of a composite sample made by combining face samples 31314 and 31315 is given under laboratory No. 31316.

System of mining, room and pillar. In 1918 the coal was cut by punchers and shot down with black powder. Men employed numbered 137 underground and 30 men aboveground.

At the time of sampling the output was 600 tons a day, 60 per cent of which was derived from advance workings. Haulage was by mules and by motors. None of the coal was shipped as run of mine. All the coal was screened in a wooden tippie with Marcus screens having 2½-inch spaces. Sizes of coal: Over 2½ inches, lump; under 2½ inches, slack. The coal was picked on tables. The three loading tracks had a capacity for 30 empty and 30 loaded railroad cars. The coal on the cars appeared bright and clean. The estimated lifetime of the mine at time of sampling was 30 years. The capacity of the mine was 650 tons a day; the maximum day's run was 769 tons.

LAFAYETTE. SIMPSON MINE.

Analysis 31391 (p. 25). Subbituminous coal, Denver region, from Simpson mine, a shaft mine at Lafayette, in sec. 2, T. 1 S., R. 69 W., on the Colorado & Southern R. R., and on the Chicago, Burlington & Quincy R. R. Coal bed, Lower Simpson; Cretaceous age, Laramie formation. Bed is level and 6 to 12 feet thick; roof, immediate, coal; floor, soft shale; cover at point of sampling, 225 feet. The bed was sampled by J. J. Forbes on January 20, 1919, as described below:

Section of coal bed in Simpson mine.

Roof 3 feet of coal.	<i>Ft. in.</i>
Coal.....	6 6
Floor, soft shale.	
Thickness of bed.....	6 6
Thickness of coal sampled.....	6 6

Sample 31391 was cut at face of 13 southwest entry main south entry.

System of mining, room and pillar, retreating. At the time of sampling the coal was undercut by air mining machines and shot down with FF black powder. Men employed numbered 67 aboveground. The tippie was of wood. At the time of sampling 95 per cent of the coal was shipped as run of mine; 5 per cent was screened through 2½-inch spaces. Sizes of coal: Over 2½ inches, lump; through 2½ inches, slack. Haulage was by electric motors and animals. There were two loading tracks, with capacity for 100 empty and 100 loaded railroad cars. The coal on the cars was bright and lustrous. The lifetime of the mine was estimated in 1919 to be 5 years. The capacity of the mine was 1,000 tons a day, the daily output 500 tons.

LOUISVILLE. ACME MINE.

Analysis 31384 (p. 25). Subbituminous coal, Denver region, from Acme mine, a shaft mine at Louisville, in sec. 8, T. 1 S., R. 69 W., on the Colorado & Southern R. R. Coal bed, "Lower Acme"; Cretaceous age, Laramie formation. Bed is 6 to 8 feet thick and lies flat; cleat runs N. 15° east. Faults and several rolls are encountered. The bed contains bone and a little shale about 3 feet from bottom. Roof, sandy shale, 18 inches roof coal left in some places; floor, soft sandy shale, smooth where it does not heave; cover at point of sampling, 185 feet. The bed was sampled at one point by J. J. Forbes on January 15, 1919, as described below:

Section of coal bed in Acme mine.

	Feet.
Roof, sandy shale.	
Coal.....	6
Floor, sand shale.	
Thickness of bed.....	6
Thickness of coal sampled.....	6

Sample 31384 was cut in 5 room, 6 northeast entry.

System of mining, room and pillar. In 1919 the coal was undercut by machine and shot down by miners with FF black powder and squibs. Very little powder was used for brushing roof or floor. Haulage was by mules and by rope hoist. Men employed numbered 95 underground and 15 above ground. The tippie was of wood covered with corrugated iron; it had shaking screens 6 by 24 feet, with holes usually 2½ inches in diameter. Of the coal 60 per cent was lump, and 40 per cent passed through shaking screens. About 20 per cent of the output was shipped as run of mine. The coal was picked in the mine and in the shaking screens. There were three loading tracks, with capacity for 24 empty and 30 loaded railroad cars. The lump coal on cars was in large lumps and presented a good appearance; screenings on cars were bright. Coal from narrow work and room necks was taken out in advance work; a recovery of 95 per cent was claimed. In 1919 the unmined area was 200 acres. The estimated lifetime of the mine was 15 to 20 years. Capacity of mine, 600 to 700 tons a day; average daily output, 600 tons; maximum day's run, 1,258 tons.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 22, pp. 55, 399.

DELTA COUNTY.

BOWIE. KING MINE.

Analysis 28920 (p. 25). Bituminous coal, Grand Mesa field, from King mine, a drift mine, Somerset district, ¾ mile northeast of Bowie, Colo., in sec. 10, T. 13 N., R. 91 W., on the Denver & Rio Grande R. R. Coal bed, King, known locally as the Juanita; Cretaceous age, Mesaverde formation. Bed is 9 to 14 feet thick, with practically no impurities; dips 3-33°, N. 29-33° E.; cleat runs N. 79-30° E.; roof, bone

and shale; floor, hard smooth bone and sandstone. Coal is cut out by "spurs" of sandstone averaging about 1 foot thick and having the appearance of dykes. The bed was sampled by C. A. Herbert on July 21, 1917, as described below:

Section of coal bed in King mine.

Section.....	A.
Laboratory No.....	28920
	<i>Ft. in.</i>
Roof, main, sandstone.....	2,000
Roof, immediate, bone.....	3 0
Coal.....	2 2
Shale.....	1 1/2
Coal.....	4 6 1/2
Floor, bone.....	
Thickness of bed.....	6 9
Thickness of coal sampled.....	6 9

The section (sample No. 28290) was cut from the last crosscut between the sixth left entries.

System of mining, room and pillar, with butt entries. In 1917 about 25 per cent of the coal was taken out in advance work, and a total recovery of 90 per cent was claimed. Haulage was by rope. There were three loading tracks, with capacity for 50 empty and 50 loaded railroad cars. The coal was cut partly by machine and by hand in the floor and shot down with FFF black powder at 5.30 p. m. by shot firers; 40 per cent dynamite was used for brushing roof or floor. Men employed numbered 60 underground and 15 above ground. The coal was dumped over a wooden tippie; very little of it was shipped as run of mine. Fifty-nine per cent of the coal passed through shaking screens; 31 per cent passed through 1-inch holes and 28 per cent through 4-inch holes. No pickers were employed on the cars. The coal consisted of large lumps and had a very good appearance on the cars. The mine had a capacity of 1,000 tons a day; the daily average output was about 450 tons, the maximum day's run 750 tons. The output for the year 1916 was 60,618 tons. The unmined area was 950 acres, and the probable lifetime of the mine was 75 years.

For results of other analyses of coal from this mine see Bureau of Mines Bull. 22, pp. 55, 400; Bull. 85, pp. 24, 164.

EL PASO COUNTY.

COLORADO SPRINGS. EL PASO MINE.

Analyses 28907 to 28910 (p. 25). Subbituminous coal, Colorado Springs field, from El Paso mine, a slope mine 3½ miles northeast of Colorado Springs, in sec. 33, T. 13 S., R. 66 W., on the Chicago, Rock Island & Pacific R. R. Coal bed, A; Cretaceous age, Laramie formation. Bed is 6½ to 11 feet thick. The east side of the mine has a shale parting about 3 feet from floor; dip, about 5° N. 35-55° E.; a face cleat runs N. 54-35° W. No faults or rolls are encountered. Roof, sandstone, overlying 6 inches to 2½ feet of roof coal; floor, soft smooth shale. The bed was sampled at three points by C. A. Herbert on May 26, 1917, as described below:

Sections of coal bed in El Paso mine.

Section.....	A.	B.	C.
Laboratory No.....	28907	28909	28908
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, main, sandstone.....	40 0	40(?)	40(?)
Roof, immediate, coal.....	6	2 0	2(?) 0
Coal.....	2 4	6 0	7 5
Dark shale.....	a5		
Coal.....	3 1		
Bone.....	a2	a2	a2
Floor, fire clay or shale.....			
Thickness of bed.....	6 0	6 2	7 7
Thickness of coal sampled.....	5 5	6 0	7 5

a Not included in sample.

Section A (sample 28907) was cut 10 feet outby face 5 east entry on left rib. Section B (sample 28909) was cut from face 20 room off 5 east entry. Section C (sample 28908) was cut from face 18 room off 6 west entry.

The ultimate analysis of a composite sample made by combining samples 28907 to 28909 is given under laboratory No. 28910.

System of mining, room and pillar, butt entries. In 1917 about 50 per cent of the coal was taken out in the advance work, and the total recovery claimed was 65 per cent. Haulage was by mules and rope. There were three loading tracks, with capacity for 14 empty and 14 loaded railroad cars. The coal was cut and sheared by hand in narrow work and in rooms, and shot down with FF black powder by miners at 4 p. m., the closing time. Men employed numbered 75 underground and 8 above ground. The coal was dumped over a wooden tippie, about 50 per cent being shipped as run of mine. The screened coal passed over shaking screens; 40 per cent passed through the 2 $\frac{3}{4}$ -inch openings and 60 per cent through the 4 $\frac{1}{2}$ -inch openings. The screenings were crushed and at times the mine run was crushed to pass through 2 $\frac{1}{2}$ -inch openings. The appearance on the cars of the screenings and the lump coal, the latter in large lumps, was good. In 1917 the unmined area was 300 acres, and the estimated life of the mine was 20 years.

PIKE VIEW STATION. PIKE VIEW MINE.

Analyses 28911 to 28916 (p. 26). Subbituminous coal, Colorado Springs field, from Pike View mine, a shaft mine in sec. 18, T. 13 S., R. 66 W., 1 mile north of Pike View station, on the Denver & Rio Grande R. R. Coal bed, A; Cretaceous age; Laramie formation. Bed is 7 to 14 feet thick; average 12 feet; dip, about 13 feet in 2,000 north; a cleat making an angle of about 30° with the vertical runs approximately east. No faults, rolls, or horsebacks are encountered. The bed contains occasional small lenses of coal $\frac{3}{4}$ inch thick. Roof, soft white sandstone above coal (about 20 inches of top coal left for roof); floor, smooth bone, 2 inches, and fire clay, 2 feet. The bed was sampled by C. A. Herbert on June 7, 8, and 29, 1917, as described below:

Sections of coal bed in Pike View mine.

Section..... Laboratory No.....	A. 28915	B. 28912	C. 28911	D. 28914	E. 28913
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....	3 0	3 0	3 0	3 0	3 0
Coal.....	7 5	8 2	7 8	8 6	7 9
Coal.....	a 8	a 4	a 4		
Bone.....	a 4	a 4		a 4	a 4
Floor, shale.					
Thickness of bed.....	11 5	11 10	11 0	11 10	11 1
Thickness of coal sampled.....	10 5	11 2	10 8	11 6	10 9

a Not included in sample.

Section A (sample 28915) was taken from right rib in 1 room off 106, 45 entry 15 feet outby face, 1 mile northwest of shaft. Section B (sample 28912) was taken from right rib in 10 entry opposite 31 room, 1 mile northwest of shaft. Section C (sample 28911) was taken from right rib in 8 room off main dip 10 feet outby face 1 mile from bottom of shaft northwest. Section D (sample 28914) was taken from face of 25 room off 106 entry, 1 mile northwest of shaft. Section E (sample 28913) was taken from right rib in 6 room outby face, 106, 45 entry, 1 mile northwest of shaft.

The ultimate analysis of a composite sample made by combining samples 28911 to 28915 is given under laboratory No. 28916.

System of mining, room and pillar, butt entry. In 1917, 40 per cent of the coal was taken out in advance work, and a total recovery of 80 per cent was claimed. Haulage was by five electric motors and by mules. The coal was undercut by machine and

shot down with FF black powder by shot firers at 6 p. m. Men employed numbered 175 underground and 13 above ground. The coal was dumped over a wooden tipple from self-dumping steel cages. There were no pickers. The screened coal consisted of large lumps, and the appearance of the lump coal and the screenings on the cars was good.

The capacity of the mine in 1917 was 1,000 tons a day, the daily average output 800 tons, and the maximum day's run 1,011 tons. The unmined area was 600 acres and the probable lifetime of the mine was 20 years.

For description and analyses of other samples from this mine, see Bureau of Mines Bull. 85, pp. 24, 166.

GUNNISON COUNTY.

SOMERSET. SOMERSET MINE.

Analyses 31817, 31798, 31799, and 31800 (p. 26). Bituminous coal, Grand Mesa field, from Somerset mine, a slope mine at Somerset, sec. 9, T. 13 S., R. 90 W., on the Denver & Rio Grande R. R. Coal bed, not named; Cretaceous age, Mesaverde formation. Average thickness of bed is 24 feet; dip, 6 per cent; roof, sandstone; floor, sandstone; cover at point of sampling, 1,000 feet. The bed was sampled by J. J. Forbes on April 15 and April 21, 1919, as described below:

Sections of coal bed in Somerset mine.

Section..... Laboratory No.....	A. 31817	B. 31798	C. 31799	D. 31800
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	5			5
Coal, bony.....	11	7	5	7
Top coal.....	2 0			2 0
Clay band.....	2			
Coal.....	7 4			
Clay.....	1 0			
Coal.....	3 0			
Shale.....	8			
Coal, dirty.....	3 0			
Floor, sandstone.				
Thickness of bed.....	18 6	7	5	3 0
Thickness of coal sampled.....	18 6	7	5	3 0

Section A (sample 31817) was cut from left rib, 15 room, 10 east entry. Section B (sample 31798) was cut from left rib, 17 room, 10 east entry, between 2 and 3 crosscuts. Section C (sample 31799) was cut from left rib, 17 room, 10 east entry, between 2 and 3 crosscuts. Section D (sample 31800) was cut from 10 east entry at mouth to 13 room.

System of mining, room and pillar. In 1919 the coal was cut by the miners and shot down with permissible explosive. Men employed numbered 116 underground and 45 aboveground. The tipple was of wood. At the time of sampling, 66 per cent of output was derived from advance workings; 95 per cent of output was shipped as run of mine; 5 per cent was screened in shaking screens capable of making three sizes—lump, nut, and slack. Haulage was by mules and engine plane. The four loading tracks had capacity for 40 empty and 40 loaded railroad cars. The coal on the cars presented a good appearance. In 1919 the probable lifetime of the mine was estimated to be 25 years. The capacity of the mine was 2,000 tons a day, the average output 1,500 tons, and the maximum day's run 1,850 tons.

For descriptions and analyses of other samples of this coal, see Bureau of Mines Bull. 85, pp. 25, 169.

HUERFANO COUNTY.

RAVENWOOD. RAVENWOOD MINE.

Analyses 31406, 31407, and 31408 (p. 26). Bituminous coal, Trinidad field, from Ravenwood mine, a slope mine, at Ravenwood, on a spur of the Colorado & Southern R. R. Coal bed, Cameron; Cretaceous age, Vermejo formation. Thickness of bed is 2 feet 6 inches to 2 feet 8 inches; dip, 4 per cent southwest; cleat, indistinct. Frequent faults and occasional rolls are encountered. The bed is uniform, the coal being of "nigger-head" variety. Roof, main, sandstone; immediate, "draw slate," averaging 14 inches thick; floor, hard, smooth fire clay; cover at points of sampling, 250 feet. The bed was sampled by J. J. Forbes on January 28 and 29, 1919, as described below:

Sections of coal bed in Ravenwood mine.

Section.....	A.	B.
Laboratory No.....	31406	31407
Roof, section A, sandstone overlaid with 17 inches of "draw slate"; section B, sandstone overlaid with 22 inches of "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 8	2 3
Floor, hard fire clay.....		
Thickness of bed.....	2 8	2 3
Thickness of coal sampled.....	2 8	2 3

Section A (sample 31406) was cut at face of 11 north main entry. Section B (sample 31407) was cut at face of 1 dip, 5 south entry.

The ultimate analysis of a composite sample made by combining face samples 31406 and 31407 is given under laboratory No. 31408.

System of mining, room and pillar. In 1919 the coal was cut by machine and shot down by one shot firer, after the miners had left, with permissible explosive fired by fuse (double tape). Permissible explosive was also used for brushing roof or floor. Men employed numbered 75 underground and 15 aboveground. None of the output was shipped as run of mine. In the wooden tippie the coal was screened through shaking screens, one 6 by 18 feet, with 1½-inch perforations, the other 6 by 16 feet, with 2½-inch perforations. Haulage was by mule, and by tail rope on slope. Five pickers were employed on car. There were three loading tracks, with capacity for 14 empty and for many loaded railroad cars. The lump coal on cars consisted of large bright lumps, and the screenings on the cars were bright. The approximate total recovery was given as 75 to 80 per cent. In 1919 the daily capacity of the mine was 225 tons, which was equal to the average output; the maximum day's run was 260 tons. It was expected that by June, 1919, the daily output would be increased to 400 tons.

LAS ANIMAS COUNTY.

COKEDALE. BON CARBO MINE.

Analysis 31451 (p. 27). Coking bituminous coal, Trinidad field, from Bon Carbo mine, a drift mine 7 miles northwest of Cokedale, in secs. 31 and 32, Tps. 32 and 33 E., R. 65 W., on the Denver & Rio Grande R. R. Coal bed, Primero; Cretaceous age, Vermejo formation. Bed is 4 to 8 feet thick and dips 1½ per cent northwest, with cleat running east. Faults are encountered, but are not frequent; no rolls or horsebacks. A band of bone and shale from 1 to 6 inches thick extends through parts of mine. Roof, shale; floor, rough, soft shale; cover at point of sampling, 220 feet. The bed was sampled by J. J. Forbes on February 13, 1919, as described on the next page.

Section of coal bed in Bon Carbo mine.

	Ft.	in.
Roof, main, shale; immediate, "draw slate."		
Coal.....	3	2
Shale.....		1½
Coal.....		5
Bone.....		½
Coal.....	1	1
Floor, shale.		
Thickness of bed.....	4	10
Thickness of coal sampled.....	4	10

Sample 31451 was cut at 1 south air course.

System of mining, room and pillar, butt entries. In 1919 the coal was cut by machine and shot down with permissible explosive after the miners had left the mine; "Giant" was used for brushing roof or floor. All the coal was shipped as run of mine to coke ovens at Cokedale. Haulage was by seven electric locomotives. The wooden tipple had a revolving dump. There were two loading tracks, with capacity for 35 empty and 40 loaded railroad cars. The appearance of the coal on the cars was good. Forty-five per cent of coal was taken out in advance work. At the time of sampling the unmined area was 700 acres, and the mine was largely in the development stage. The capacity of the mine was 700 tons a day, the actual daily average 700 tons, and the maximum day's run 750 tons. The average daily tonnage of coal coked was 700 to 1,500 tons.

DELAGUA. CASS MINE.

Analysis 31432 (p. 27). Bituminous coal, Trinidad field, from Cass mine, a drift mine at Delagua, sec. 15, T. 31 S., R. 65 W., on the Colorado & Southeastern R. R. Coal bed, Delagua; Cretaceous or Tertiary age, Raton formation. Bed is 3 feet 6 inches to 4 feet thick and lies flat. The vein is regular and clean. The immediate roof is 13 inches of "draw slate"; main roof, sandstone; floor, hard, rough fire clay; cover at point of sampling, 300 feet. The bed was sampled by J. J. Forbes on February 3, 1919, as described below:

Section of coal bed in Cass mine.

	Ft.	in.
Roof, main, sandstone; immediate, "draw slate."		
Coal.....		4½
Shale.....		¾
Coal.....	3	5¾
Floor, hard fire clay.		
Thickness of bed.....	3	11
Thickness of coal sampled.....	3	11

Sample 31432 was cut at face of 3 east entry.

System of mining, room and pillar. In 1919 the coal was cut by machine and shot down with a permissible explosive by shot firers after miners had left mine. The same explosive was used for brushing roof or floor. Haulage was by mules and by one electric locomotive. Men employed numbered 68 underground and 7 above-ground. The tipple was of wood. A small amount of the coal was mined in advance work; the mine was being opened and no pillars were withdrawn. It was expected the recovery would be 90 per cent. The probable lifetime of the mine was 15 to 20 years. The daily capacity at time of sampling was 250 tons, the daily average output 230 tons, and the maximum day's run 270 tons. It was expected the daily output would be increased to 500 tons.

DELAGUA. DELAGUA MINE.

Analysis 29351 (p. 27). Bituminous coal, Trinidad field, from Delagua mine, a drift mine in sec. 15, T. 31 S., R. 65 W., at Delagua, about 4 miles west of Ludlow station on the Colorado & Southeastern R. R. Coal bed, Delagua; Cretaceous or Tertiary age, Raton formation. The bed is 5 to 8 feet thick. Well-defined face cleats run approximately east and west, or parallel to the dip. The bed is comparatively free of persistent partings of foreign matter. Immediately overlying the coal in the roof are 3 to 4 inches of friable bony coal, above which is mud-clay shale with partings (slickensides), necessitating heavy timbering. Floor is of shale; cover at point of sampling, about 500 feet. The bed was sampled by C. A. Herbert on October 1, 1917, as described below:

Section of coal bed in Delagua mine.

	Ft.	in.
Roof, shale.		
Coal.....	1	4
Shale ^a		5
Coal.....		11
Bone.....		1
Coal.....		10
Bone.....		$\frac{1}{2}$
Coal.....		9 $\frac{1}{2}$
Shale ^a		7
Coal.....	2	10
Floor, shale.		
Thickness of bed.....	7	10
Thickness of coal sampled.....	6	10

Sample 29351 was cut at face of 7 room, 11 west entry.

In 1917 the coal was cut by pick, and the use of explosives had been reduced to a minimum; permissible explosives were used and were fired by shot firers after other employees had left the mine. Electric locomotives and mules were used for haulage. Very little lump coal was produced. The daily output of the mine in 1917 was 2,200 tons.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 85, pp. 28, 177.

DELAGUA. DELAGUA FIRST NORTH DISTRICT.

Analyses 31423 to 31426 (p. 27). Bituminous coal, Trinidad field, from Delagua First North District, a drift mine at Delagua, 5 miles from Ludlow, on the Colorado & Southeastern R. R. Coal bed, No. 1 or Delagua; Cretaceous or Tertiary age, Raton formation. Bed is 5 to 6 feet thick and lies flat. A few faults, one dike, and occasional rolls are encountered. The bed contains impure layers in certain sections of the mine. Roof, "draw slate" 8 to 16 inches, then sandstone; floor, soft rough fire clay; cover at points of sampling, 300 to 500 feet. The bed was sampled by J. J. Forbes on February 4, 1919, as described below:

Sections of coal bed in Delagua First North District.

Section.....	A. 31423	B. 31424	C. 31425
Laboratory No.....			
Roof, sandstone, "draw slate" about 3 to 15 inches.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	5 3	5 3	5 5
Floor, hard fire clay.			
Thickness of bed.....	5 3	5 3	5 5
Thickness of coal sampled.....	5 3	5 3	5 5

^a Not included in sample.

Section A (sample 31423) was cut in 10 room, 8 east, 14 east entry. Section B (sample 31424) was cut in 9 room, 7 east, 6 north entry. Section C (sample 31425) was cut at face of 18 east parting.

The ultimate analysis of a composite sample made by combining face samples 31423 to 31425 is given under laboratory No. 31426.

System of mining, block. In 1919 the coal was cut by miners by pick. No explosives were used. Haulage was by four electric locomotives and by mules. The tippie was of wood. Five to 10 per cent of the coal was taken out in advance work, and a total recovery of 96 per cent was claimed. The capacity of the mine at time of sampling was 1,000 tons, the actual daily average was 900 tons, and the maximum day's run 1,100 tons.

DELAGUA. DELAGUA THIRD NORTH DISTRICT.

Analysis 31427 (p. 27). Bituminous coal, Trinidad field, from Delagua Third North District, a slope mine at Delagua, 5 miles from Ludlow, on the Colorado & Southern and the Denver & Rio Grande R. R. Coal bed, Delagua; Cretaceous or Tertiary age, Raton formation. Bed is 6 to 7 feet thick and dips 2° northwest, with cleat running northeast and southwest; roof, 3 to 24 inches of "draw slate," with hard sandstone above it; floor, hard, medium, rough fire clay; cover at point of sampling, 700 feet. The bed was sampled at one point by J. J. Forbes on February 5, 1919, as described below:

Section of coal bed in Delagua Third North District.

	Ft. in.
Roof, main, sandstone; immediate, "draw slate."	
Coal.....	1 9
"Sulphur" band.....	½
Coal.....	1 8½
Dirty streak ^a	3
Coal.....	2 7
Floor, hard fire clay.	
Thickness of bed.....	6 4
Thickness of coal sampled.....	6 1

Sample 31427 was cut at face of 17 west, 5 north.

Systems of mining, room and pillar and block. In 1919, 50 per cent of the coal was cut by machine and shot down with a permissible explosive by shot firers after miners had left the mine; the same explosive was used for brushing roof or floor. Men employed numbered 175 underground and 60 above ground. The tippie was of wood. The coal was screened through bar screens 18 feet long, having 1½-inch spaces. Haulage was by five electric locomotives and by mule. Four pickers were employed on car and conveyor and there were four loading tracks. The lump coal, medium lumps, on the cars had a bright luster, as had the screenings. Five per cent of the coal was taken out in the advance work, and a total recovery of 95 per cent was claimed. The daily capacity of the mine was 1,000 tons, the actual daily average 1,000 tons, and the maximum day's run 1,200 tons.

HASTINGS. HASTINGS MINE.

Analyses 29277, 29278, and 29465 (p. 27). Bituminous coal, Raton Mesa field, from Hastings mine, a slope mine at Hastings, in sec. 25, T. 32 S., R. 64 W., on the Colorado & Southeastern R. R., with connections to the Colorado & Southern R. R. and the Denver & Rio Grande R. R. Coal bed, A and B beds, Cretaceous age, Vermejo (?) formation. Bed varies from 4½ feet to over 7 feet in thickness and dips about 10 per cent west at outcrop, decreasing to less than 4 per cent west at face of slope.

^a Not included in sample.

Well defined slips or "faces" are encountered. Roof and floor are of shale. The bed was sampled by C. A. Herbert on September 21 and 22, 1917, and on November 5, 1917, as described below:

Sections of coal bed in Hastings mine.

Section..... Laboratory No.....	A. 29277	B. 29278	C. 29465
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, shale.....			
Coal.....			7
"Sulphur".....			a ½
Coal.....			2½
Bone.....			1
Coal.....	2 0	3 6	5
Bone.....	a 1	a 5½	1
Coal.....	5	3½	10
Bone.....	a 4		1
Coal.....	2 6		1 8
Floor, shale.....			
Thickness of bed.....	5 4	4 3	4 0
Thickness of coal sampled.....	4 11	3 9½	3 11½

a Not included in sample.

Section A (sample 29277) was cut in B bed from right rib in crosscut off main opposite 3 north entry, about 1 mile from mine opening. Section B (sample 29278) was cut in A bed at face of last room off 7½ N., about 1 mile from mine opening. Section C (sample 29465) was cut at face of crosscut, 60 feet north of air shaft between A and B beds.

System of mining, double entry, room and pillar. In 1917 the coal was undercut by hand to a depth of 3½ to 5 feet; owing to the coal being friable and to the occurrence of slips or "faces" undercutting was not difficult; the face of the main and back slope was cut by chain breast mining machines. Pillars were pulled after rooms were finished. The coal was shot with a permissible explosive by shot firers after all the men were out of the mine. Haulage was by mules attached to cars by shafts or "guns." There were two loading tracks, with capacity for 150 empty and 150 loaded cars.

For descriptions and analyses of other samples of this coal see Bureau of Mines Bull 22, pp. 69, 449, and Bull. 85, pp. 29, 178.

MORLEY. MORLEY MINE.

Analyses 32046, 32047, and 32048 (p. 27). Bituminous (coking) coal, Trinidad field, from Morley mine, a slope and a drift mine at Morley, on the Atchison, Topeka & Santa Fe R. R. Coal bed, Engle-Starkville; Cretaceous age, Trinidad (?) formation. Bed is 4½ to 10 feet thick; dip (approximately 18 per cent), almost due south. A cleat runs east and west. Roof, 2½ feet of roof coal, above which is sandstone; floor, fairly smooth, soft shale; cover at points of sampling, 900 feet. The bed was sampled by J. J. Forbes on May 29, 1919, as described below:

Sections of coal bed in Morley mine.

Section..... Laboratory No.....	A. 32046	B. 32017
	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, sandstone, 3 feet of coal left for protection.....		
Coal.....	4 4	3 8
Shale and bone.....	2	5
Coal.....	2 0	1 11
Floor, shale.....		
Thickness of bed.....	6 6	6 0
Thickness of coal sampled.....	6 6	6 0

Section A (sample 32046) was cut at face of main slope. Section B (sample 32047) was cut at face of 7 left entry, main slope.

The ultimate analysis of a composite sample made by combining face samples 32046 and 32047 is given under laboratory No. 32048.

System of mining, room and pillar, in panels. The mine is opened on the east side by a drift and on the west side by a slope. The east side is on the retreating system and was to be worked out soon. At the time of sampling, no explosives were used, pick methods being employed exclusively. Men employed numbered 215 underground and 57 above ground. Ten per cent of the output was shipped as run of mine. The wooden tippie had bar screens 20 feet long, with $2\frac{3}{4}$ -inch spaces, shaking screens 20 feet long by 6 feet wide, with $2\frac{3}{4}$ -inch holes, and small-coal screens with bars 20 feet long, spaced $1\frac{1}{2}$ inches apart. Of the coal going to screens 75 per cent passed through. Motors and mules were used for haulage in the east side opening, and rope and mules were employed on the west side. The coal was picked within the mine. There were three loading tracks, with capacity for 40 empty railroad cars and $1\frac{1}{2}$ miles of track for loaded railroad cars. The screenings on the cars were fairly bright. The lumps were large and bright. Of the mine output 50 per cent was shipped to Pueblo, where it was washed and finally coked at a by-product plant. Forty per cent of the coal was taken out in the advance work, and a recovery of 85 per cent was claimed. The probable lifetime of the mine was 40 years. The capacity of the mine at time of sampling was 1,100 tons, which equaled the actual average output.

For descriptions and analyses of other samples of coal from this mine see Bureau of Mines Bull. 22, pp. 69, 450, and Bull. 85, pp. 29, 179.

SOPRIS. SOPRIS NO. 2 MINE.

Analysis 31949 (p. 27). Bituminous coal, Trinidad field, from Sopris No. 2 mine, a slope mine at Sopris, in NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 33, T. 33 S., R. 64 W., on the Colorado & Southern R. R. Coal bed, Cameron (locally known as Sopris); Cretaceous age, Vermejo formation. Bed is 4 feet thick and dips $1\frac{1}{2}^{\circ}$. Occasional faults and rolls are encountered. Roof, "draw slate;" floor, rough, very hard sandstone. The bed was sampled by J. J. Forbes on May 14, 1919, as described below:

Section of coal bed in Sopris No. 2 mine.

Roof, main, sandstone; immediate, shale.

	Ft. in.	
Bone and coal mixed.....	6	
Coal.....	1	2
Bone.....	2	
Coal.....	5	
Bone.....	1	
Coal.....	5	
Bone.....	1	
Coal.....	1	3
Bony shale ^a	7	
Coal.....	3	0
Floor, hard sandstone.		
Thickness of bed.....	7	8
Thickness of coal sampled.....	7	1

Sample 31949 was cut at face of 3 east entry.

System of mining, room and pillar, in panels. In 1919 the coal was cut and sheared by machine and by hand and shot down with a permissible explosive by shot firers after the miners had left the mine. Haulage was by mule, by three electric loco-

^a Not included in sample.

motives, and by rope. Men employed numbered 350 underground and 55 above-ground. The tippie was of wood. None of the coal was shipped as run of mine, entire output going to Pueblo, Colo., to be crushed, washed, and coked in a by-product plant. The size produced by crushing was about $\frac{3}{4}$ inch. Two pickers were on the belt. There was one loading track, $\frac{3}{4}$ mile long. The coal on the cars presented a bright appearance. Seventy per cent of the coal was mined in advance work, and the recovery was claimed to be 95 per cent. The probable lifetime of the mine was 50 years. The daily average output of the mine was 800 tons.

STARKVILLE. STARKVILLE MINE.

Analysis 32030 (p. 27). Bituminous coal, Trinidad field, from Starkville mine, a drift mine $\frac{1}{2}$ mile from Starkville, on the Santa Fe R. R. Coal bed, known as Engle-Starkville; Cretaceous age, Vermejo formation. Bed is 4 to 6 feet thick and lies flat. Frequent rolls are encountered. Roof, in some sections 2 feet of "draw slate," in others sandstone; floor, medium hard, fairly smooth shale; cover at point of sampling was over 1,000 feet; elevation of entrance, 6,100 feet above sea. The bed was sampled by J. J. Forbes on May 20, 1919, as described below:

Section of coal bed in Starkville mine.

Roof, main, sandstone; immediate, black shale.

	Ft. in.	
Coal.....	1	10
Bone.....		1
Coal.....		2
Bone.....		1
Coal.....		4
Bone.....		4
Coal.....		4
Shale ^a		6
Coal.....	1	2
Floor, shale.		
Thickness of bed.....	4	10
Thickness of coal sampled.....	4	4

Sample 32030 was cut at face of 8 south entry, J-6.

System of mining, room and pillar. In 1919 very little development work was being done, the mine being worked retreating. The coal was broken down by squeezes. No explosives were used for the coal; permissible explosives fired by fire boss, were used only in rock or bottom shale. Men employed numbered 220 underground and 40 aboveground. The tippie was of wood. None of the coal was shipped as run of mine. Bar screens 18 feet in length, with 4-inch and $\frac{3}{4}$ -inch spaces, were used. Screenings up to $\frac{3}{4}$ inch were washed and coked; 75 per cent of the coal was lump. Haulage was by mules and by five electric locomotives. One picker was employed on the car. There were two loading tracks with large capacity for railroad cars. The lump coal, large and small lumps, on the cars was bright; the screenings on the cars were dull. From 15 to 20 per cent of the coal was taken out in the advance work and about 85 per cent from pillars; the recovery claimed was 95 per cent. The estimated lifetime of the mine was 25 years. The capacity and average daily output of the mine was 900 tons. The daily output, however, was to be increased after new development. Of the coal from this property 75 per cent was shipped to the operator's by-product coking plant at Pueblo, Colo., for coking, and 25 per cent was sold to the Atchison, Topeka & Santa Fe R. R.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 22, p. 71, and Bull. 85, pp. 32,182.

^a Not included in sample.

MESA COUNTY.

CAMEO. CAMEO MINE.

Analyses 28917 to 28919 (p. 28). Bituminous coal, Book Cliffs field, from Cameo mine, a slope mine in NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 34, T. 10 S., R. 98 W., at Cameo, 4 miles northeast of Palisades, on the Denver & Rio Grande R. R. Coal bed, Cameo; Cretaceous age, Mesaverde formation. Bed is 9 to 10 feet thick and dips 2 to 4° northeast, with well-defined cleat. There is a thin layer of bony coal about 8 inches from roof, 10 inches near the middle, and 3 feet at the bottom. Roof, good hard dark shale; floor, bone; cover at points of sampling, 2,000 feet (?). The bed was sampled by C. A. Herbert on July 13, 1917, as described below:

Sections of coal bed in Cameo mine.

Section.....	A. 28917	B. 28918
Laboratory No.....		
	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, main, sandstone and shale; immediate, shale.....	2 0	
Coal.....	7	8
Bone.....	2	2
Coal.....	1 10	3 3
"Sulphur".....	1	
Coal.....	1 8	
Bone.....	<i>a</i> 10	<i>a</i> 10
Coal.....	10	1 0
Bone and coal.....	<i>a</i> 1 6	
Floor, bone.....	3 0?	3 0?
Thickness of bed.....	7 6	5 11
Thickness of coal sampled.....	5 2	5 1

a Not included in sample.

Section A (sample 28917) was taken from 7 north off 6 west. Section B (sample 28918) was taken from face of 22 room off 8 west.

The ultimate analysis of a composite sample made by combining samples 28917 and 28918 is given under laboratory No. 28919.

System of mining, room and pillar, butt entry. In 1917, 50 per cent of the coal was taken out in advance work, and the total recovery claimed was 90 per cent. Haulage was by two electric locomotives and mules. There were three loading tracks, with capacity for 35 empty and 35 loaded railroad cars. The coal was undercut by machine in the bone and shot down by the shot firers at 6 p. m., permissible explosives and 40 per cent dynamite being used to brush the roof or the floor. Men employed numbered 55 underground and 15 aboveground. The coal was dumped over a wooden tippie, about 80 per cent being shipped as run of mine. There were no pickers. The coal was screened through shaking screens 6 by 10 feet, with 3-inch openings, and 6 by 16 feet, with 1½-inch openings, respectively. The appearance of the screenings was good. The capacity of the mine in 1917 was 700 tons a day, and the average daily output was 600 tons.

For other analyses of coal from this mine see Bull. 22, pp. 72, 458.

OURAY COUNTY.

RIDGWAY. KENNEDY MINE.

Analysis 31044 (p. 28). Subbituminous coal, Tongue Mesa field, from B. Kennedy mine, a drift mine 12 miles northeast of Ridgway, in NW. $\frac{1}{4}$ sec. 23, T. 46 N., R. 7 W. Ridgway is on a narrow-gage line of the Denver & Rio Grande R. R. Coal bed, not named; Upper Cretaceous age, Mesaverde formation. Bed is reported to be 40 feet thick and dips 15°; cover at point of sampling, 100 feet. The bed was sampled by M. R. Campbell on September 18, 1919, as described:

Section of coal bed in Lou Creek mine.

Roof, not noted.	<i>Feet.</i>
Coal (reported).....	<i>a</i> 29
Coal (sampled).....	7
Coal.....	<i>a</i> 4
Floor, not noted.	
Thickness of bed.....	40
Thickness of coal sampled.....	7

Sample 31044 was measured in main entry 300 feet from mine mouth. Wagon mine coal was hauled to Ridgway.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 85, pp. 35, 192.

PITKIN COUNTY.

PLACITA. PLACITA MINE.

Analysis 25826 (p. 28). Bituminous coal from Placita mine at Placita, in sec. 6, T. 11 S., R. 88 W., on the Crystal River R. R.

Coal bed, not named; Upper Cretaceous age, Mesaverde formation. The coal bed was sampled on August 14, 1916, by E. Russell Lloyd. The sample represented 3 feet 5 inches of coal, the entire thickness of bed except 2 inches of bone at the top, which was not sampled. Sample 25826 was measured 1,200 feet southwest of mine mouth.

ROUTT COUNTY.

MILNER. CHERGO (OLD HUTCHINSON) MINE.

Analysis 31038 (p. 28). Bituminous coal, Yampa field, from Chergo mine, a slope mine in NW. $\frac{1}{4}$ sec. 13, T. 5 N., R. 86 W., 7 miles south of Milner, on the Denver Northwestern & Pacific R. R. Coal bed known as Wadge; Upper Cretaceous age, middle group of coal beds in the Mesaverde formation. Bed is 9 feet 6 inches thick and dips 10° or 12° west; it consists of clear coal, without partings, and is regular in thickness. Roof, shale; floor, not noted; cover at point of sampling, 50 feet. The bed was sampled by M. R. Campbell on September 6, 1918, sample 31038, representing 9 feet 6 inches of coal. The thickness of the bed was measured at face of main slope, 300 feet from mine mouth.

The mine was operated by no particular system and was worked only for local supply. There was no regular output. The haulage was by horsepower.

MOUNT HARRIS. MOUNT HARRIS MINE.

Analyses 31199 to 31207 (p. 28). Bituminous coal, Yampa field, from Mount Harris mine, a slope mine 1,000 feet south of Mount Harris Station, in sec. 15, T. 6 N., R. 87 W. on the Denver & Salt Lake R. R. Coal bed, Wadge; Cretaceous age, Mesaverde formation. Bed is 8 feet to 9 feet 6 inches thick; dip, 16° north, $8^{\circ} 26'$ east. A well-defined cleat runs south 30° east. One fault (8-foot displacement) has been encountered, but no rolls or horsebacks. The bed is free from impurities. Roof, good, of sandy shale; floor, hard and fairly smooth, of sandy shale; cover at points of sampling, 100 to 800 feet. Elevation of entrance is 6,400 feet above sea level. The bed was sampled by J. J. Forbes October 29 to 31, 1918, as described below:

Sections of coal bed in Mount Harris mine.

Section.....	A. 31199	B. 31200	C. 31201	D. 31202	E. 31203	F. 31204	G. 31205	H. 31206
Laboratory No.....								
Roof, sandy shale:	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
“Top slate”.....								
Coal.....	8 1 $\frac{1}{2}$	8 9	9 0	9 5	5 6	8 4	9 0	8 6
Shale.....	<i>a</i> 2 $\frac{1}{2}$				<i>a</i> 3			
Coal.....	1 0				3 3 $\frac{1}{4}$			
Floor, sandy shale:								
Thickness of bed.....	9 4	8 9	9 0	9 5	8 10	8 4	9 0	8 6
Thickness of coal sampled.....	9 1 $\frac{1}{2}$	8 9	9 0	9 5	8 9 $\frac{1}{4}$	8 4	9 0	8 6

a Not included in sample.

Section A (sample 31199) was cut from left rib, 20 feet from face of 10 south entry.

Section B (sample 31200) was cut from face of 3 east, main south slope. Section C (sample 31201) was cut 20 feet from face of G slope, left rib, main south entry. Section D (sample 31202) was cut from face of 7 east back entry, 2 south entry. Section E (sample 31203) was cut at face of 10 east entry, main south entry. Section F (sample 31204) was cut from left rib in last crosscut in A slope and 40 feet from face of entry. Section G (sample 31205) was cut 30 feet from face of main south entry on left rib. Section H (sample 31206) was cut from rib of main dip and 5 feet from face.

The ultimate analysis of a composite sample made by combining face samples 31199 to 31206, is given under laboratory No. 31207.

System of mining, panel. In 1918 the coal was cut by machine and shot down with black powder by three shot firers after miners had left mine. Men employed numbered 175 underground and 50 aboveground. The tipple was of wood. The openings of the screens were 8 inches, 3 inches, and $1\frac{1}{2}$ inches; of the coal going to screens 70 per cent passed through them. The coal was picked on car by two pickers. The four loading tracks had capacity for 40 empty and 60 loaded railroad cars. The lump coal on the cars was large and bright; the screenings on the cars were clean and bright. Fifty per cent of the coal was mined in advance work, and the recovery claimed was 85 per cent. The unmined area was approximately 1,600 acres, and the estimated lifetime of the mine was 20 years. The daily capacity of mine was 2,000 tons, the daily average 1,500 tons, and the maximum day's run 2,200 tons.

For descriptions and analyses of other samples of this coal see Bureau of Mines Bull. 123, pp. 32, 170.

MOUNT HARRIS. WADGE MINE.

Analyses 31233 to 31235 (p. 29). Bituminous coal, Yampa field, from Wadge mine, a slope mine at Mount Harris, in sec. 15, T. 6 N., R. 87 W., on the Denver & Salt Lake R. R. Coal bed, Wadge; Cretaceous age, Mesaverde formation. Thickness of bed is 8 feet 7 inches, and dip 16 per cent, with rectangular cleat. Roof and floor sandy shale; cover at points of sampling, 400 to 500 feet. The bed was sampled at two points by J. J. Forbes on November 13, 1918, and represented 8 feet 6 inches and 8 feet 7 inches of coal.

Section A (sample 31233) was cut at face of 3 north, main entry. Section B (sample 31234) was cut at face of 1 north, main entry.

The ultimate analyses of a composite sample made by combining face samples 31233 and 31234 is given under laboratory No. 31235.

System of mining, room and pillar, in panels. In 1918 the coal was cut by hand and by mining machines and shot down with black powder. Men employed numbered 80 underground and 30 aboveground. The tipple was of wood. At the time of sampling the output was 400 tons a day, 50 per cent of which was from advance workings. None of the coal was shipped as run of mine, but all was screened in shaking screens with $2\frac{1}{2}$ and $1\frac{1}{4}$ inch spaces. Sizes of coal, lump, nut, and slack. The coal was picked on screens by one picker. Haulage was by rope with steam and electric haulage engines. The three loading tracks had capacity for 60 empty and 35 loaded railroad cars. The appearance of the coal on the cars was good. The estimated lifetime of the mine in 1918 was 30 years. The capacity of the mine was 1,000 tons a day, and the maximum day's run 698 tons.

For description and analysis of other samples from this mine see Bureau of Mines Bull. 22, pp. 80, 482.

DUNKLEY CANYON. WEBBER MINE.

Analysis 30862 (p. 29). Bituminous coal, Yampa field, from Webber mine, a drift mine at Dunkley Canyon, 10 miles south of Mount Harris, in NW. ¼ sec. 2, T. 4 N., R. 87 W., not on any railroad. Coal bed, Wadge; Upper Cretaceous age, middle coal group of the Mesaverde formation. Bed is 11 feet 9 inches thick and is regular; dip, 54°; cleat, not observed. Bed generally is clear coal, without partings. Roof and floor are of shale. The cover at point of sampling is 25 feet. The bed was sampled by M. R. Campbell September 3, 1919. Sample was a grab sample taken at face and represented most of the coal bed. The face was in too dangerous a condition for a sample to be cut across it. The drift had been driven in about 125 feet and was mined only to supply the needs of a few local ranchmen.

OAK CREEK. ARGO MINE.

Analyses 31130 to 31134 (p. 29). Bituminous coal, Yampa field, from Argo mine, a drift and slope mine 1 mile northwest of Oak Creek, in sec. 36, T. 4 N., R. 86 W., on the Denver & Salt Lake R. R. Coal bed, Argo or Pinnacle; Cretaceous age, Mesaverde formation. Bed is 9 feet 6 inches to 10 feet 10 inches thick; dip, 10° to 12° northwest; cleat on strikes southwest. No faults are encountered; rolls are small and infrequent. One inch of sandstone, and at intervals a little bone are present near the roof. The roof consists of 8 inches sandy shale; the floor is good, medium smooth, of sandy shale. Cover at points of sampling, 800 to 1,000 feet. Elevation of entrance is 7,400 feet above sea level. The bed was sampled by J. J. Forbes on October 6 and 7, 1918, as described below:

Sections of coal bed in Argo mine.

Section.....	A.	B.	C.	D.
Laboratory No.....	31130	31131	31132	31133
Roof, sandy shale:	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	5 8	10 2	8	10
Sandstone.....	a ¾		a 1	
Coal.....	9 8½		1 11	
Bone.....			2	3
Coal.....			1 0	8 8
Bone.....			5	
Coal.....			5 6	
Floor, sandy shale:				
Thickness of bed.....	10 2	10 2	9 9	9 9
Thickness of coal sampled.....	10 1½	10 2	9 8	9 9

a Not included in sample.

Section A (sample 31130) was cut at face of south entry, 5,000 feet southwest of portal. Section B (sample 31131) was cut 15 feet from face of 9 slope, left rib, 120 feet below south entry. Section C (sample 31132) was cut at face of south slope, 375 feet below 4 level. Section D (sample 31133) was cut at face of 3 level, 2,100 feet from south slope.

The ultimate analysis of a composite sample made by combining face samples 31130 to 31133 is shown under laboratory No. 31134.

System of mining, room and pillar. In 1918 the coal was cut by machine and shot down with FF black powder by shot firers after the miners had left the mine. About 100 men were employed aboveground and 250 underground. The tippie was of wood. About 40 per cent of the output was shipped as run of mine. The coal was screened over a screen with 3-inch round perforations and over a shaking screen 12 by 6 feet, with 1½-inch round perforations. Excluding run of mine, the proportions of sizes shipped were: Slack, 25 per cent; nut, 19 per cent; lump, 56 per cent. Haulage was by three electric motors, electric hoists, and by mules. Two pickers were employed.

The four loading tracks had capacity for 60 empty and 60 loaded railroad cars. The lump coal on the cars had a good appearance, the lumps being large; screenings on the cars were bright. About 50 per cent of the coal was mined in advance work, and recovery was about 80 per cent. The unmined area consisted of 1,200 acres. The daily capacity of the mine was 2,000 tons, the average output 1,500 tons, and the maximum day's run 2,400 tons. The output for 1917 was 330,000 tons.

WELD COUNTY.

ERIE. PURITAN MINE.

Analysis 31323 (p. 29). "Black lignite" or subbituminous coal, Denver region, called locally Northern Lignite field, from Puritan mine, a shaft mine 6 miles northeast of Erie, in sec. 34, T. 2 N., R. 68 W., on the Union Pacific R. R. The coal is of Cretaceous age, Laramie formation. The bed is 10 feet 6 inches thick and lies flat. Roof, "soapy" shale over the 3 feet of top coal left; floor, sandstone; cover at point of sampling, 110 feet. The bed was sampled by J. J. Forbes on December 12, 1918. The sample represented the thickness mined, or 6 feet 9 inches of coal.

Sample 31323 was cut at face of 13 room, 4 northwest entry.

System of mining, room and pillar. In 1918 the coal was undercut by puncher machines and shot down with FF black powder. Men employed numbered 139 underground and 20 aboveground. At the time of sampling the output was 1,200 tons a day, 60 per cent of which was derived from advance workings; 35 per cent was shipped as run of mine, and 65 per cent was screened in shaking screens with $2\frac{1}{2}$ -inch holes. Sizes of coal: $2\frac{1}{2}$ -inch round-hole slack; $2\frac{1}{2}$ -inch lump. Haulage was by motor and by mules. The three loading tracks had capacity for 50 empty and 50 loaded railroad cars. The appearance of the coal on the cars was good. The estimated lifetime of the mine at time of sampling was 15 years. The capacity of the mine was 1,500 tons a day and the maximum day's run 1,626 tons.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 22, pp. 82, 489.

FREDERICK. BAUM MINE.

Analysis 31344 (p. 29). Subbituminous coal, Denver region, locally known as Northern Lignite field, from Baum mine, a shaft mine $\frac{1}{2}$ mile from Frederick, in sec. 36, T. 2 N., R. 68 W., on the Union Pacific R. R. Coal bed, Cretaceous age, Laramie formation. Bed is 6 feet 10 inches thick and lies level; roof, "soapstone"; floor, sandy "soapstone"; cover at point of sampling, 200 feet. The bed was sampled by J. J. Forbes on December 16, 1918. One foot of top coal was left in roof, and the sample represented the remaining thickness of the bed, or 5 feet 6 inches of coal.

Section of coal bed in Baum mine.

Sample 31344 was cut at face of 13 room, 16 northeast entry.

System of mining, room and pillar. The coal is cut by electric chain cutting machines and shot down with black powder. Men employed numbered 50 underground and 30 aboveground. The tibble is of frame construction. At the time of sampling the output was 500 tons a day, 25 per cent of which was derived from advance workings. All the coal was screened in screens with $2\frac{1}{2}$ -inch spaces. Haulage was by mules to partings, thence by electric locomotive to bottom. There were three loading tracks, with capacity for 2,000 tons. The estimated lifetime of the mine at time of sampling was 20 years. The capacity of the mine was 1,000 tons a day and the maximum day's run 1,034 tons.

IDAHO.

FREMONT COUNTY.

MONIDA. SCOTT & BUEY MINE.

Analysis 29821 (p. 29). Subbituminous coal, from Scott & Buey mine, in sec. 11, T. 14 N., R. 38 E., 15 miles east of Monida, on the Oregon Short Line. Coal bed, not named; Upper Cretaceous age, Frontier (?) formation. Thickness at point of sampling, 3 feet 8 inches, the sample represented 2 feet 8 inches of coal, which was overlaid by 6 inches of clay and 6 inches of coal. The bed was sampled by G. R. Mansfield on September 15, 1917. The sample, which was cut at face of main entry 110 feet from mine mouth, was weathered.

TETON COUNTY.

DRIGGS. BELLENT MINE.

Analysis 29182 (p. 29). Bituminous coal from Bellent mine, 10 miles west of Driggs, in sec. 36, T. 5 N., R. 43 E., on the Oregon Short Line R. R. Mine has no railroad connection. Coal bed, not named; Upper Cretaceous age, Frontier (?) formation. The bed was sampled by G. R. Mansfield on August 21, 1917.

Section of the coal bed in Bellent mine.

	Ft. in.
Roof, not noted.	
Coal.....	3 4
Bone ^a	a 2
Clay ^a	a 8
Coal ^a	1 0
Bone.....	a 2
Coal.....	3 0
Floor, not noted.	
Thickness of bed.....	8 4
Thickness of coal sampled.....	7 4

The sample was cut at face of main entry, 315 feet north 35° west of mine mouth.

VICTOR. PINE CREEK PASS MINE.

Analysis 29280 (p. 29). Subbituminous coal, from Pine Creek Pass mine, a slope mine 8 miles west of Victor, in sec. 25 (?), T. 3 N., R. 44 E., on the Oregon Short Line R. R. Mine has no railroad connection. Coal bed, not named; Upper Cretaceous age, Frontier (?) formation. The bed was sampled by G. R. Mansfield on September 9, 1917. The sample represented 1 foot 10 inches of coal. The section was measured on north wall of slope, 12 feet from mine mouth, under 12 feet of cover.

ILLINOIS.

CHRISTIAN COUNTY.

PANA. SPRINGSIDE MINE.

Analyses 25748 to 25752 and 26336, 26337, and 26338 (p. 30). Bituminous coal, Illinois field, from Springside mine, a shaft mine 1 mile northeast of Pana, on the Chicago & Eastern Illinois R. R. Coal bed, No. 6; Carboniferous age, Carbondale formation. Bed is 7 feet 6 inches thick and has a slight northeast dip, with frequent rolls or horsebacks; roof, black, slaty shale from a few inches to 14 feet thick, then strong lime-

^a Not included in sample.

stone; floor, hard, smooth clay several feet thick; cover, about 710 feet. The bed was sampled by J. R. Fleming on August 2, 1916, and October 18, 1916, as described below:

Sections of coal bed in Springside mine.

Section.....	A.	B.	C.	D.	E.	F.
Laboratory No.....	25748	25749	25750	25751	26336	26337
Roof, black shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal bright, brittle.....	1 10	2 3½	2 3	8	3 1	2 7
Bone and "sulphur".....	a 1	a 2		a 1	a ¾	½
"Sulphur" band.....			a ½			
Coal, bright and brittle.....	6	1 4	5	2 4		
"Sulphur" band.....			a 1	a 1		
Bone and "sulphur".....	a 1½					
"Mother coal" and "sulphur".....		a ½				
"Mother coal" and bone.....		6		1 3		
Coal, bright, firm.....	4		4		3 3	3 1
Coal, laminated dull.....			a ½	a ¾		
"Sulphur" band.....		a 1½				
Bone and "sulphur".....	a 1	4		6		
Coal, hard bright.....			2 6			
Coal laminated with dull bands.....	2 6					a 4
"Blue band," bone and coal.....		a ½		a ½		
"Sulphur" bands.....	a ½				a 1½	
Shale, "blue band".....				10		1 2½
Coal, bright hard.....					1	
Coal, hard dull.....	10	8				
"Sulphur" band.....		a ¼				
Coal, laminated dull.....		11				
Shale bands and coal.....	a 5	a 5	a 2½	a 5		
Coal, hard dull.....	1 0	1 0	1 0	9		
Floor, clay.						
Thickness of bed.....	7 8¾	7 10	6 10½	7 4	7 4	7 3
Thickness of coal sampled.....	7 0	7 ½	6 6	6 9	7 2	6 11

a Not included in sample.

Section A (sample 25748) was cut in 20 main entry, main north, 5,400 feet from shaft. Section B (sample 25749) was cut in room 13, 17 west, main north, 5,400 feet from shaft. Section C (sample 25750) was cut in room 10, 5 south, off 5 east, off main north, 2,700 feet from shaft. Section D (sample 25751) was cut at face of 7 east, off main north, 4,500 feet from shaft. Section E (sample 26336) was cut in room 9, off 14 north, off main east south, 4,800 feet southeast of shaft. Section F (sample 26337) was cut at face of main east south entry, 5,400 feet southeast from shaft.

The ultimate analysis of a composite sample made by combining samples 25748 to 25751 is given under laboratory No. 25752. The ultimate analysis of a composite sample made by combining samples 26336 and 26337 is given under laboratory No. 26338.

System of mining, room and pillar, in panels. In 1916 the mining was done by hand on bench above "blue band"; the top was shot down and the bottom shot up later with FF black powder. The daily average output of the mine was 1,125 tons, mostly derived from advance workings. Forty per cent of the coal passed through a 1¼-inch screen. All coal going to washery was crushed to 3½-inch size. There was track capacity for 60 empty and 60 loaded cars. The probable lifetime of the mine was about 25 years.

FRANKLIN COUNTY.

BUCKNER. UNITED No. 14 MINE.

Analysis 26129 (p. 30). Bituminous coal, Illinois field, from United No. 14 mine, a shaft mine ½ mile east of Buckner, on the El Dorado-St. Louis branch of the Illinois Central R. R.; also served by the Chicago, Burlington & Quincy R. R. Coal bed: Herrin, or No. 6, of the Illinois Geological Survey; Carboniferous age, Carbondale formation. Bed averages 9 feet 6 inches in thickness; roof, gray shale; floor, fire clay; cover at

sampling, 550 feet. The bed was sampled by J. R. Fleming on September 13, 1916, as described below:

Section of coal bed in No. 2 mine.

	Ft. in.
Roof, shale.	
Top coal ^a	2 0
Coal, bright, brittle.....	1 0
Bone ^a	1
Coal, laminated with dull streaks.....	4 3
"Blue band," shale ^a	1
Coal, hard.....	1 4
Floor, fire clay.	
Thickness of bed.....	8 9
Thickness of coal sampled.....	6 7

Sample 26129 was cut at face of 8 panel, off 6 north, off main east, inby room neck No. 9.

The shaft is 555 feet deep. System of mining, room and pillar, in panels. In 1916 the coal was all undercut by chain breast machines and shot down with permissible explosive. Daily average output, over 4,000 tons; capacity, 5,000 tons.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 123, pp. 33, 171.

BUSH. BUSH NO. 2 MINE.

Analyses 30877 to 30881 (p. 30). Bituminous coal, Illinois field, from Bush No. 2 mine, a shaft mine $1\frac{1}{2}$ miles northwest of Bush, in sec. 31, T. 7 S., R. 1 E., on the Missouri Pacific R. R. Coal bed, Herrin, or No. 6; Carboniferous age, Carbondale formation. Bed is $7\frac{1}{2}$ to 12 feet thick, and averages 10 feet. There are top, middle, and bottom benches; top bench left as roof in mine. "Blue band" about $1\frac{1}{2}$ inches, 18 to 30 inches above the coal. Lower coal is thickest where whole bed is thickest. Coal rather soft; "sulphur" streaks very common. Fault crosses main north entry just off bottom. About midway of bed is a persistent layer of "mother coal." Roof, gray shale 18 feet thick; floor, fire clay, which heaves a little. Cover at points of sampling, 160 feet. The bed was sampled by G. H. Cady and C. R. Schroyer on August 27, 1918, as described below:

Sections of coal bed in Bush No. 2 mine.

Section.....	A. 30877	B. 30878	C. 30879	D. 30880
Laboratory No.....				
Roof, gray shale.				
Coal.....	^a 1 3	^a 3? 0	^a 1 6?	^a (?)
Coal.....	3 1 $\frac{1}{4}$	3 2	3 4	3 2
"Soot band".....	$\frac{1}{4}$	2 $\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{8}$
Coal.....	1 8	2 0	1 9	1 10
"Blue band".....	^a 1 $\frac{1}{2}$	^a 1 $\frac{1}{2}$	^a 1 $\frac{1}{2}$	^a 2
Coal.....	1 5 $\frac{1}{2}$	2 11	1 9	1 6
Floor, gray clay.				
Thickness of bed.....	7 7 $\frac{1}{2}$	11 4 $\frac{3}{4}$	8 5 $\frac{3}{4}$	6 8 $\frac{1}{8}$
Thickness of coal sampled.....	6 3	8 3 $\frac{1}{4}$	6 10 $\frac{1}{2}$	6 6 $\frac{1}{8}$

Section A (sample 30877) was cut at face of main northeast entry, 1,100 feet east and 400 feet north of shaft. Section B (sample 30878) was cut at end of northwest entry, 1,400 feet west and 300 feet north of shaft. Section C (sample 30879) was cut at face of 5 south entry, 2 west entry, south, 500 feet south, 1,000 feet west of shaft. Section D (sample 30880) was cut at end of main south entry, 1,200 feet south of shaft.

The ultimate analysis of a composite sample made by combining face samples 30877 to 30880 is given under laboratory No. 30881. At time of sampling the daily output was 2,000 tons.

^a Not included in sample.

CHRISTOPHER. OLD BEN No. 10 MINE.

Analyses 29741 to 29747, and 29754 (p. 31). Bituminous coal, Illinois field, from Old Ben No. 10 mine, a shaft mine 1 mile north of Christopher, on the Chicago, Burlington & Quincy R. R. Coal bed, Herrin, or No. 6, in the Illinois Geological Survey; Carboniferous age, Carbondale formation. The bed contains a "blue band" 2 to 10 inches thick, and is 7 to 10 feet thick. No faults, but a few rolls or horsebacks, are encountered. Roof, average, 18 inches of roof coal and main roof shale; floor, hard, smooth fire clay; vertical depth from surface at point of sampling, 600 feet. The bed was sampled by W. B. Plank on February 13 to 15, 1918, as described below:

Sections of coal bed in No. 10 mine.

Section..... Laboratory No.....	A. 29741	B. 29742	C. 29743	D. 29744	E. 29745	F. 29746	G. 29754
Roof, shale and coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....							2 1
Coal.....	5 4½	6 0	4 0	3 2	9	4 ½	a 4 0
"Mother coal".....			½		½		a ½
Coal.....			10		10 ½	1 6½	a 10
"Mother coal".....			¼		¼		a ¼
"Sulphur".....				½			
Coal.....			1 1	1 10½	8½		a 1 1
"Blue band".....	a 2½		a ¾	a 2½			a ¾
"Mother coal".....					1¼		
Coal.....	1 5		2 0	2 3½	3 5		a 2 0
Bony coal.....	a 4½	6			9½	9½	
Coal.....	3						
Floor, fire clay.							
Thickness of bed.....	7 7½	6 6	8 3	7 7	6 8	6 5	10 4
Thickness of coal sampled..	7 ½	6 6	7 11¼	7 4½	6 8	6 5	2 1

a Not included in sample.

Section A (sample 29741) was cut from last crosscut, 12 northeast entry, at mouth of 1 east. Section B (sample 29742) was cut at 12 room neck, 5 west, 6 southwest. Section C (sample 29743) was cut at face of 19 room, 10 northwest, 100 feet from 10 northwest. Section D (sample 29744) was cut from last crosscut, 3 northeast at mouth of 4 west. Section E (sample 29745) was cut at face of 14 southwest entry at 22 room. Section F (sample 29746) was cut at last crosscut, 11 west, 3 southeast, at 8 room. Section G (sample 29754) was cut at 18 room, 10 northwest, 60 feet from entry, top coal.

The ultimate analysis of a composite sample made by combining face samples 29741 to 29746 is given under laboratory No. 29747.

System of mining, panel. In 1918 the coal was cut by machine and shot down with permissible explosives by four shot firers. Men employed numbered 430 underground and 75 above ground. The tippie was of steel, having a rescreener and self-dumping cage. None of the output was shipped as run of mine. Sizes of coal: 6-inch lump and 3 by 6 inch egg, prepared in tippie; Nos. 1, 2, and 3 nut, prepared in rescreeners. Haulage was by 17 electric locomotives. The coal was picked on picking tables by 10 to 12 pickers. There was track capacity for 50 empty and 50 loaded railroad cars. Fifty per cent of the coal was taken out in advance work, and total recovery was about 55 per cent. The unmined area comprised 600 acres, and the estimated lifetime of the mine was 12 years. The capacity of the mine in 1918 was 4,000 tons a day; the actual average 3,000 tons, and the maximum day's run 3,450 tons.

CHRISTOPHER. OLD BEN No. 11 MINE.

Analyses 30892 to 30896 (p. 31). Bituminous coal, Illinois field, from Old Ben No. 11 mine, a shaft mine 1¼ miles north of Christopher, in sec. 14, T. 6 S., R. 1 E., on the Chicago, Burlington & Quincy R. R. Coal bed, Herrin, or No. 6; Carboniferous

age, Carbondale formation. The thickness of the bed averages 10 feet 2 inches. There are three distinct benches—lower one (below "blue band"), middle, and upper; lower part of lower bench is very hard and thin-bedded. Cover at points of sampling, 590 feet. The bed was sampled by C. R. Schroyer on September 5, 1918, as described below:

Sections of coal bed in Old Ben No. 11 mine.

Section..... Laboratory No.....	A. 30892	B. 30893	C. 30894	D. 30895
Roof, gray clay shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....			4 6?	2½ 3
Coal.....	3 8½	1 7	2 11	3 3½
Coal, dull and bright.....		1 0		2 8
Coal, bright.....		1 11		
"Mother coal".....	½	1		
Coal.....	1 10	6½	2 0	
"Blue band".....		a 5¼		a 1½
Clay, coaly.....	a 1½			
"Mother coal".....			1½	
Coal.....	2½		2½	
Gray rock.....	a 3		a 2½	
Coal.....	1 10	1 3½	2 4	2 0
Coal, hard thin.....		7		3
Floor, gray clay.				
Thickness of bed.....	8 0	7 5	12 3½	8 4
Thickness of coal sampled.....	7 7½	6 11¾	12 0¾	8 2½

^a Not included in sample.

Section A (sample 30892) was cut at face of 2 north entry, 12 west entry, 1 northwest entry, 1,000 feet west, 3,500 feet north of main shaft. Section B (sample 30893) was cut at face of main west entry, 4,500 feet west of main shaft. Section C (sample 30894) was cut at face of 1 northeast entry, 2,700 feet east and 300 feet north of main shaft. Section D (sample 30895) was cut at face of 1 southeast entry, 4 east panel, 29 room, 2,000 feet east of main shaft.

The ultimate analysis of a composite sample made by combining face sample 30892 to 30895 is given under laboratory No. 30896. At time of sampling the daily output was 4,500 tons.

HERRIN. NO. 5 (FRANKLIN EMERY) MINE.

Analyses 30867 to 30871 (p. 31). Bituminous coal, Illinois field, from No. 5 (Franklin Emery) mine, a shaft mine 4 miles north and 1 mile east of Herrin, in sec. 33, T. 7 S., R. 2 E., on the Chicago, Burlington & Quincy R. R. Coal bed, Herrin, or No. 6; Carboniferous age, Carbondale formation. Thickness of bed, maximum, 12 feet; minimum, 9 feet; average, 10 feet. The bed contains three well-defined benches; "blue band," the only common impurity, varies from 18 to 36 inches above bottom of bed. Coal rather uniform, bright, and lustrous. Roof, gray, sandy shale, or coal, fairly constant, in places rolling; floor, fire or floor clay; cover at points of sampling, 340 feet. The bed was sampled by G. H. Cady and C. P. Schroyer on August 28, 1918, as described below:

Sections of coal bed in No. 5 (Franklin Emery) mine.

Section..... Laboratory No.....	A. 30867	B. 30868	C. 30869	D. 30870
Roof, gray sandy shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	4 1	1 9½	4 4	7 9
"Mother coal".....	½			
Coal.....	7½	1 10½	2 9	
"Mother coal".....	1½			
Coal.....	2 8½	2 6½		
"Blue band".....	a 1½		a 1½	
Coal.....	2 6	1 6	2 4	
Floor, gray clay.				
Thickness of bed.....	10 2	7 8¾	9 6¼	7 9
Thickness of coal sampled.....	10 ¾	7 8¾	9 5	7 9

^a Not included in sample.

Section A (sample 30867) was cut at face of 14 room, 7 northwest entry, 2,300 feet west and 740 feet north of shaft. Section B (sample 30868) was cut in crosscut between 1 and 2 northeast entries, 1,115 feet north and 515 feet east of shaft. Section C (sample 30869) was cut at face of 3 room, 7 southeast entry, 1,400 feet east, and 515 feet south of shaft. Section D (sample 30870) was cut in stub of 7 west entry, 4 south, off west, 2,140 feet south and 1,540 feet west of shaft.

The ultimate analysis of a composite sample made by combining face samples 30867, 30868, 30869, and 30870 is given under laboratory No. 30871. At time of sampling daily output was 1,500 tons.

ORIENT. ORIENT MINE.

Analyses 30266, 30267, 30844, and 31050 (p. 31). Car samples of bituminous coal, Illinois field, from Orient mine, a shaft mine, 520 feet deep, at Orient, on a spur connecting with the Chicago, Burlington & Quincy, the Chicago & Eastern Illinois, and Illinois Central Railroads. Coal bed, Herrin, or No. 6, of the Illinois Geological Survey; Carboniferous age, Carbondale formation. Two samples of coal, one (30266) representing 15 cars and one (30267) 17 cars, were collected by W. B. Plank on April 3 and 4, 1918. One sample (30844) of coal, representing 32 cars, was collected by T. Fraser on July 22 to 24, 1918; one sample (31050) of coal, representing 159 cars, was collected by T. Fraser on September 13 to 23, 1918. At the time of sampling the average daily capacity was 5,000 tons and the maximum day's run 6,777 tons. Loaded track capacity, 250 cars.

For description and analyses of other samples of coal from this mine see Bureau of Mines Bull. 123, pp. 33, 173.

ROYALTON. NORTH OR NO. 1 MINE.

Analyses 30205 and 30207 (p. 32). Bituminous coal, Illinois field, from North or No. 1 mine, opened by two shafts 317 feet deep at Royalton, on the Missouri Pacific R. R. Coal bed, Herrin, or No. 6, of the Illinois Geological Survey; Carboniferous age, Carbondale formation. Thickness of the bed averages from 7 to 11 feet; from 1½ to 2 feet of roof coal is left in mining. Roof, gray shale; floor, fire clay; a "blue band" consisting of bony coal or shale and averaging from ½ inch to several inches thick lies about 18 inches above the floor and is rejected by miners. Two car samples, one (30205) representing 13 cars and one (30207) representing 22 cars of coal, were collected by W. B. Plank on March 26 and 27, 1918.

System of mining, double-entry room and pillar. Prior to October 1, 1918, FF black powder was used for blasting down the coal in the rooms, but permissible explosives with No. 6 detonators were used in the entries only; since that time permissible explosives have been installed and used entirely. Machines were used for undercutting the coal. About 500 men were employed underground. Haulage was by electric locomotives and by mules. The daily average output of mine was 3,800 tons and the maximum day's run 4,154 tons. In 1917, 555,565 tons of coal were mined; the output for 1918 was 644,323 tons.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 123, pp. 33, 174.

SESSER. SESSER COAL CO. NO. 1 MINE.

Analyses 26492 to 26497 and car samples 30206, 30208, 30485, and 30486 (p. 32). Bituminous coal, Illinois field, from No. 1 mine, a shaft-mine 640 feet deep, 1½ miles southeast of Sesser, on the Chicago, Burlington & Quincy R. R. Coal bed, Herrin, or No. 6, of the Illinois Geological Survey; Carboniferous age, Carbondale formation. Bed is 7 to 8 feet thick, excluding top coal left on roof; roof, gray, dirty shale; floor, clay; cover at points of sampling, 650 feet. Car samples representing 32 cars were

taken by W. B. Plank on about March 25, 1919: sample 30206 represented 9 cars; sample 30208 represented 5 cars; sample 30485 represented 10 cars; sample 30186 represented 8 cars. The bed was sampled by J. R. Fleming on October 27 and 28, 1916, as described below:

Sections of coal bed in No. 1 mine.

Section..... Laboratory No.....	A. 26492	B. 26493	C. 26494	D. 26495	E. 26496
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....	a 2 6	a 2 6	a 2 4	a 2 0	a 2 0
Coal, bright.....	5 3	3 0	5 1	5 7	2 1
Bone and "mother coal".....		$\frac{1}{2}$			
Bone and "sulphur".....			a $\frac{1}{2}$		
"Mother coal".....					$\frac{1}{2}$
Coal, bright.....		1 8	8		3 2
Bone.....		a 1			
Coal, bright.....		7			
"Blue band".....	a 1	a 1 $\frac{1}{2}$	a 1 $\frac{1}{2}$	a 1 $\frac{1}{2}$	a 1 $\frac{1}{2}$
Coal, bright, hard.....	1 8	1 10	3 1	1 6	1 7
Floor, clay.					
Thickness of bed.....	7 0	7 4	7 0	7 2 $\frac{1}{2}$	7 0
Thickness of coal sampled.....	6 11	7 1 $\frac{1}{2}$	6 10	7 1	6 10 $\frac{1}{2}$

* Not included in sample.

Section A (sample 26492) was cut at face of main east entry, 4,400 feet east of shaft. Section B (sample 26493) was cut at face of 1 new south entry, off main east, 5,000 feet southeast of shaft. Section C (sample 26494) was cut in 2 room, 3,200 feet east 10° south of shaft. Section D (sample 26495) was cut at face of main north entry, 4,400 feet north of shaft. Section E (sample 26496) was cut at face of 8 east entry, main north entry, 3,000 feet northeast of shaft.

The ultimate analysis of a composite sample made by combining face samples 26492, 26493, 26494, 26495, and 26496 is given under laboratory No. 26497.

The mine is operated on the panel system. In 1916 the coal was undercut by chain machines and by puncher machines, which were to be changed to electric-chain machines. Permissible explosive was used in blasting. Four sizes of coal were loaded. The daily output of the mine in 1916 was 3,000 tons, which equals the capacity.

WEST FRANKFORT. OLD BEN NO. 8 MINE.

Analyses 30887 to 30890 (p. 33). Bituminous coal, Illinois field, from Old Ben No. 8 mine, a shaft mine $\frac{1}{4}$ mile south of West Frankfort, in sec. 25, T. 7 S., R. 2 E., on the Illinois Central, Chicago & Eastern Illinois, and Chicago, Burlington & Quincy Railroads. Coal bed, Herrin, or No. 6; Carboniferous age, Carbondale formation. Maximum thickness of bed, 10 feet; minimum, 7 feet 6 inches; average, 9 feet; roof, poor, gray clay, top coal left; floor, gray clay shale; cover at points of sampling, 464 feet. The bed was sampled by C. R. Schroyer on September 3, 1918, as described below:

Sections of coal bed in Old Ben No. 8 mine.

Section..... Laboratory No.....	A. 30887	B. 30888	C. 30889
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	a 1 3?		
Coal.....	2 6 $\frac{3}{4}$	3 9 $\frac{1}{4}$	1 10
"Mother coal".....	4 1 $\frac{1}{2}$		8 $\frac{1}{4}$
Coal.....		1	$\frac{1}{2}$
Pyrite and "mother coal".....		1 9	2 4 $\frac{1}{2}$
Coal.....	a 1 $\frac{1}{4}$	a 1 $\frac{1}{2}$	a 1
"Blue band".....	1 10	1 7 $\frac{1}{2}$	1 9
Floor, clay-shale.			
Thickness of bed.....	9 10 $\frac{3}{4}$	7 4	6 8 $\frac{7}{8}$
Thickness of coal sampled.....	8 6 $\frac{1}{2}$	7 2 $\frac{1}{4}$	6 7 $\frac{1}{8}$

* Not included in sample.

Section A (sample 30887) was cut in face of 4 east, north entry, 5,200 feet east and 4,700 feet north of shaft. Section B (sample 30888) was cut at face of 6 west entry, main south entry, 3,200 feet south and 3,600 feet west of shaft. Section C (sample 30889) was cut at face of main south entry, 6,100 feet south of shaft.

The ultimate analysis of a composite sample made by combining face samples 30887, 30888, and 30889 is given under laboratory No. 30890. At time of sampling the daily output of the mine was 4,500 tons of coal.

WEST FRANKFORT. OLD BEN No. 9 MINE.

Analyses 30882 to 30886 (p. 33). Bituminous coal, Illinois field, from Old Ben No. 9 mine, a shaft mine 1 mile east of West Frankfort, in sec. 20, T. 7 S., R. 3 E., on the Chicago, Burlington & Quincy R. R. Coal bed, Herrin, or No. 6; Carboniferous age, Carbondale formation. Maximum thickness of bed is 9 feet 4 inches; minimum, 6 feet; average, 9 feet. The coal is rather hard and has a bright luster. Roof, gray clay shale, top coal left; floor, clay and shale. The bed was sampled by C. R. Schroyer on September 4, 1918, as described below:

Sections of coal bed in Old Ben No. 9 mine.

Section.....	A. 30882	B. 30883	C. 30884	D. 30885
Laboratory No.....				
Roof, clay shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	4 9 ³ / ₄	3 9 ³ / ₄	4 9 ³ / ₄	3 0
“Mother coal”.....		1		
Coal.....		1 5		
“Blue band”.....	a 1 ¹ / ₄	a 1 ¹ / ₄	a 1 ¹ / ₄	
Pyrite.....				a ¹ / ₁₆
Coal.....	1 10	1 4	1 10	3 8
Coal.....		6		
Floor, clay and shale.				
Thickness of bed.....	6 9	7 3	6 9	6 8 ¹ / ₈
Thickness of coalsampled.....	6 7 ³ / ₄	7 1 ³ / ₄	6 7 ³ / ₄	6 8

a Not included in sample.

Section A (sample 30882) was cut at face of 4 west entry, main south, 1,950 feet west and 2,300 feet south of main shaft. Section B (sample 30883) was cut at face of 1 east entry, northeast, 2,875 feet east and 700 feet north of main shaft. Section C (sample 30884) was cut at face of main south entry, 4,800 feet south and 300 feet east of main shaft. Section D (sample 30885) was cut in back north entry, 4,200 feet north and 300 feet east of shaft.

The ultimate analysis of a composite sample made by combining face samples 30882, 30883, 30884, and 30885 is given under laboratory No. 30886. At time of sampling the daily output was 4,500 tons.

PERRY COUNTY.

DUQUOIN. PARADISE MINE.

Analyses 26462 to 26469 (p. 33). Bituminous coal, Illinois field, from Paradise mine, a shaft mine 380 feet deep, 3 miles east of Duquoin, on the Illinois Central R. R. Coal bed, Herrin, or No. 6, of the Illinois Geological Survey; Carboniferous age, Carbondale formation. Bed is 9 feet to 10 feet 6 inches thick; roof, gray, slaty shale, top coal being left up; floor, underclay, 4 feet thick; cover at points of sampling, 380 feet. The bed was sampled by J. R. Fleming on October 21, 1916, as described below:

Sections of coal bed in Paradise mine.

Section..... Laboratory No.....	A. 26462	B. 26463	C. 26464	D. 26465	E. 26466	F. 26467
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....	<i>a</i> 2 6	<i>a</i> 2 0	<i>a</i> 2 6	<i>a</i> 3 0	<i>a</i> 3 0	<i>a</i> 2 6
Top parting.....	Streak.	Streak.				
Top coal.....			<i>a</i> 9	<i>a</i> 9		
Coal (bright).....	2 5	1 11		5		
Bone.....	<i>a</i> $\frac{3}{4}$					
Coal, laminated.....	8					
Bone and shale.....		<i>a</i> 1				
Coal, with dull laminations.....		3 8				
Bone and "sulphur".....	<i>a</i> 1			<i>a</i> 1 $\frac{1}{2}$		
Coal, from dull to bright.....			3 8			
Coal, dull and bituminous bands.....				3 4		
"Rashy" coal.....					<i>a</i> 11	
Coal with "mother coal" partings.....					4 0	1 5
"Blue band".....		<i>a</i> $\frac{4}{4}$	<i>a</i> 2	<i>a</i> 5	<i>a</i> 1	
Coal, hard.....	2 4	1 7	1 11			
Coal, bright.....				1 8 $\frac{1}{2}$	1 6	3 6
"Blue band".....	<i>a</i> 1 $\frac{1}{4}$					<i>a</i> $\frac{1}{2}$
Coal, hard.....	1 6					1 10
Bottom coal.....		<i>a</i> 7				
Floor, clay.						
Thickness of bed.....	9 8	10 2	9 0	9 9	9 6	9 3 $\frac{1}{2}$
Thickness of coal sampled.....	6 11	7 2	5 7	5 5 $\frac{1}{2}$	5 6	6 9

a Not included in sample.

Section A (sample 26462) was cut at room 26, 2 south, main east, 2,800 feet south of shaft. Section B (sample 26463) was cut at face of 12 south entry, 2 plug east. Section C (sample 26464) was cut at face of main east entry. Section D (sample 26465) was cut at face of main north entry. Section E (sample 26466) was cut at face of 7 west entry, main north entry, 4,400 feet north-northwest of shaft. Section F (sample 26467) was cut at face of 9 south entry, 5 west, main north, 3,600 feet northwest of shaft.

The ultimate analysis of a composite sample made by combining face samples 26462, 26463, 26464, 26465, 26466, and 26467 is shown under laboratory No. 26468. A sample of top coal was also taken, for the proximate analysis of which see laboratory No. 26469. This sample was cut at room 6, 10 south, main east.

System of mining, room and pillar, in panels. In 1916 the coal was undercut by chain mining machines and shot with black blasting powder. The coal was hand picked on a shaker screen and on the car. There were four loading tracks under the tipple. Egg and nut sizes of coal were rescreened. The daily capacity of the mine in 1916 was 3,000 tons and the average daily output 2,500 tons.

DUQUOIN: SECURITY NO. 1 MINE.

Analyses 31033 to 31037 (p. 33). Bituminous coal, Illinois field, from No. 1 mine, a shaft mine 3 miles south of Duquoin, in sec. 29, T. 6 S., R. 1 W. Coal bed, Herrin, or No. 6; Carboniferous age, Carbondale formation. Thickness of bed varies from 7 feet to 9 feet; average, 7 feet 6 inches; roof, "soapstone"; floor, gray, clay shale; cover at points of sampling, 85 feet. The bed was sampled by C. R. Schroyer on September 10, 1918, as described below:

Sections of coal bed in No. 1 mine.

Section..... Laboratory No.....	A. 31033	B. 31034	C. 31035	D. 31036
Roof, "soapstone."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	<i>a</i> 1 0	<i>a</i> Coal.	<i>a</i> 2 0	<i>a</i> 1 (?)
Coal.....	5 0	2 6	1 0	5 2
Clay and "mother coal".....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$
Coal.....	1 $\frac{1}{4}$	2 9	7	1 $\frac{1}{4}$
"Mother coal".....			$\frac{1}{4}$	
Coal.....			2 8 $\frac{1}{2}$	
"Blue band".....	<i>a</i> 2	<i>a</i> 1 $\frac{1}{4}$	<i>a</i> 1 $\frac{3}{4}$	<i>a</i> 1 $\frac{1}{2}$
Coal.....	1 0	1 1 $\frac{1}{4}$	1 2 $\frac{1}{2}$	8
Floor, gray clay shale.				
Thickness of bed.....	7 4 $\frac{1}{4}$	6 6	7 8 $\frac{1}{4}$	7 2 $\frac{3}{4}$
Thickness of coal sampled.....	6 2 $\frac{1}{4}$	6 4 $\frac{3}{4}$	5 6 $\frac{3}{4}$	6 1 $\frac{1}{4}$

a Not included in sample.

Section A (sample 31033) was cut in 17 north entry, 4 west north, 2 room, 1,000 feet north and 5,000 feet west of shaft. Section B (sample 31034) was cut at face of 3 south entry, 8 west south, about 4,000 feet south and 1,000 feet west of shaft. Section C (sample 31035) was cut at face of 8 room, south of 6 east south, 2,500 feet south and 2,000 feet east of shaft. Section D (sample 31036) was cut at face of 18 south entry, 4 west south, 3,200 feet west and 1,200 feet south of shaft.

The ultimate analysis of a composite sample made by combining samples 31033, 31034, 31035, and 31036 is given under laboratory No. 31037. At time of sampling the daily production was 2,700 tons.

SALINE COUNTY.

GRAYSON. SALINE No. 6 MINE.

Analyses 28448, 28449, and 28450 (p. 33). Bituminous coal, Illinois field, from Saline No. 6, a shaft mine, 330 feet deep, at Grayson, 2½ miles east of Eldorado, on the Louisville & Nashville and the Big Four Railroads. Coal bed, Herrin, or No. 5, of the Illinois Geological Survey; Carboniferous age, Carbondale formation. The coal is rather firm and is 5 to 7 feet thick; roof, shale, characterized by numerous pyrite concretions, called "nigger heads"; floor, clay; cover at points of sampling, 350 feet. The bed was sampled by J. R. Fleming on May 15 and 16, 1917, as described below:

Sections of coal bed in No. 6 mine.

Section.....	A.	B.
Laboratory No.....	28448	28449
Roof, slaty shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bright.....	3 4½	2 2½
Bone and shale.....	a ½	
Bone and "sulphur".....		a ½
Coal, hard, lustrous.....	1 8	1 9
"Sulphur".....		Streak.
Coal, bright, hard.....		1 0
Floor, clay.		
Thickness of bed.....	5 1	5 0
Thickness of coal sampled.....	5 ½	4 11½

a Not included in sample.

Section A (sample 28448) was cut in face of 7 room, 8 east, 3 southwest entry. Section B (sample 28449) was cut in face of 5 west, 4 southwest entry.

The ultimate analysis of a composite sample made by combining face samples 28448 and 28449 is given under laboratory No. 28450.

System of mining, room and pillar. In 1917 the coal was undercut by chain machines, both shortwall and breast. FF black blasting powder was used, the shots being fired by shot firers after miners had left the mine. Men employed numbered 180 underground. Haulage was by loose-gate cars and by mules. The daily production at time of sampling averaged 1,150 tons.

WILLIAMSON COUNTY.

HERRIN. POND CREEK (BOBBY DIX) MINE.

Analyses 30872 to 30876 (p. 34).. Bituminous coal, Illinois field, from Pond Creek (Bobby Dix) mine, a shaft mine 4 miles northeast of Herrin, in sec. 5, T. 8 S., R. 2 E., on the Chicago, Burlington & Quincy R. R. Coal bed, Herrin, or No. 6; Carboniferous age, Carbondale formation. Bed averages 8½ feet in thickness; the maximum variation is about 10 to 15 feet. The coal is rather soft and brittle, and there is much fine coal. There are three benches, the top one being left as roof; "blue band," maximum 1½ inches, 17 to 26 inches above bottom; thin seams of "mother coal" at several

horizons in middle bench. Roof, 18 to 20 inches of top coal, above which is gray shale ("soapstone"), 15 to 18 feet; floor, gray clay shale, generally level. The bed was sampled by C. R. Schroyer on August 29, 1918, as described below:

Sections of coal bed in Pond Creek (Bobby Dix) mine.

Section.....	A.	B.	C.	D.
Laboratory No.....	30872	30873	30874	30875
Roof, top coal and "soapstone."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	<i>a</i> (?)	<i>a</i> 2? 0	<i>a</i> 1? 8	<i>a</i> 1 6
Coal.....	2	3 8	5 4½	4 3½
Pyrite.....	½			
Coal.....	2 6			
"Mother coal".....				
Coal.....	1 10½	1 4½		
"Mother coal".....				
Coal.....	1 6½			
"Blue band".....	<i>a</i> 1½	1½		
Coal.....	1 2	1 8	1 5½	2 2½
Coal.....		<i>a</i> 1?		
Floor, gray clay shale.				
Thickness of bed.....	7 4¾	9 10	8 6	8 0
Thickness of coal sampled.....	7 3¼	6 10	6 10	6 6

a Not included in sample.

Section A (sample 30872) was cut at face at end of main south entry, about 1,500 feet south of shaft. Section B (sample 30873) was cut at face at end of main north entry, 1,500 feet north of shaft. Section C (sample 30874) was cut at face of 6 east entry, main south, 1,200 feet south and 1,800 feet east of shaft. Section D (sample 30875) was cut at face of 5 southwest entry, 1,500 feet south and 1,000 feet west of shaft.

The ultimate analysis of a composite sample made by combining face samples 30872, 30873, 30874, and 30875 is given under laboratory No. 30876. The daily output at time of sampling was 1,600 tons.

RENDVILLE No. 2 (WEAVER) MINE.

Analyses 30863 to 30866 (p. 34). Bituminous coal, Illinois field, from No. 2 (Weaver) mine, a shaft mine 3¼ miles northwest of Herrin, in sec. 1, T. 8 S., R. 1 E., on the Illinois Central and Chicago, Burlington & Quincy Railroads. Coal bed, Herrin, or No. 6; Carboniferous age, Carbondale formation. Bed varies in thickness from 8 feet 7 inches to 10 feet 4 inches. There are three benches; the top bench, 1 foot 4 inches to 2 feet of hardest coal, was left for roof. Roof, gray clay shale; floor, clay shale; cover at point of sampling, 210 feet. The bed was sampled by C. R. Schroyer on August 31, 1918, as described below:

Sections of coal bed in No. 2 (Weaver) mine.

Section.....	A.	B.	C.
Laboratory No.....	30863	30864	30865
Roof, "soapstone."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 4	7 1	<i>a</i> 1 6
Coal.....	5 8	<i>a</i> 3	3 6¼
"Mother coal".....			½
Coal.....			1 6
"Blue band".....	<i>a</i> 2	<i>a</i> 2½	<i>a</i> 1½
Coal.....	1 7	<i>a</i> 2 0?	1 11
Floor, gray clay shale.			
Thickness of bed.....	8 9	9 6½	8 7
Thickness of coal sampled.....	8 7	7 1	6 11½

a Not included in sample.

Section A (sample 30863) was cut in back south entry, main south, 3,200 feet south of shaft. Section B (sample 30864) was cut at face of 3 west entry, main north entry, 800 feet north and 3,600 feet west of shaft. Section C (sample 30865) was cut at face of 7 west south entry, 2,500 feet south and 1,000 feet west of shaft.

The ultimate analysis of a composite sample made by combining face samples 30863, 30864, and 30865 is given under laboratory No. 30866. At time of sampling the daily output was 2,300 tons.

HERRIN. REND NO. 2 MINE.

Analyses 28810 to 28815 (p. 34). Bituminous coal, Illinois field, from Rend No. 2 mine, a shaft mine, 215 feet deep, $4\frac{1}{2}$ miles northwest of Herrin, on the Illinois Central and Chicago, Burlington & Quincy Railroads. Coal bed, Herrin, or No. 6, of Illinois Geological Survey; Carboniferous age, Carbondale formation. Bed is 7 feet 6 inches to 11 feet 6 inches thick, including about 2 feet of coal left up for roof. The bed was sampled by J. R. Fleming on June 7 to 8, 1917, as described below:

Sections of coal bed in No. 2 mine.

Section..... Laboratory No.....	A. 28810	B. 28811	C. 28812	D. 28813	E. 28814
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal, not sampled.....	a 2 0	a 1 10	a 2 1	a 2 3	a 1 10 $\frac{1}{2}$
Coal, banded.....	8	8	9		
Coal.....					
Coal, hard, bright.....	4 4				
Bone.....		$\frac{1}{2}$	a $\frac{1}{2}$	a 1	
Coal.....		4 3	1 2 $\frac{1}{2}$		
Coal, with a few partings.....				4 11	
Coal, slightly laminated.....					5 1
Bone.....			a $\frac{1}{2}$		
Coal.....			3		
"Blue band".....	a 1	a $\frac{1}{2}$	a $\frac{1}{2}$	a 1	a 2 $\frac{1}{2}$
Coal.....	1 9	2 0	2 $\frac{1}{2}$	1 7	2 0
Bottom coal, "sulphury".....				a 2	
Floor, clay.					
Thickness of bed.....	8 10	8 10	9 4	9 1	9 2
Thickness of coal sampled.....	6 9	6 11 $\frac{1}{2}$	7 $\frac{1}{2}$	6 6	7 1

a Not included in sample.

Section A (sample 28810) was cut at face of 10 east entry, main south. Section B (sample 28811) was cut at face of 7 room, 1 south stub, 8 west, main south. Section C (sample 28812) was cut at in 12 room, 3 west, main north. Section D (sample 28813) was cut at in 2 room, 2 north panel, 2 east, main north. Section E (sample 28814) was cut in 26 room, 1 east, main south.

The ultimate analysis of a composite sample made by combining face samples 28810, 28811, 28812, 28812, and 28814, is given under laboratory No. 28815.

System of mining, room and pillar. In 1917 the coal was undercut by chain machines and shot down with FF black powder. All of the coal was screened. The daily capacity of the mine at time of sampling was 3,500 tons.

INDIANA.

GREENE COUNTY.

JASONVILLE. GILMOUR NO. 7 MINE.

Analyses 31295 to 31299 (p. 34). Bituminous coal, bituminous coal field, from Gilmour No. 7 mine, a shaft mine 3 miles southwest of Jasonville, on the Southeastern R. R., with Chicago, Indianapolis, and Louisville connections. Coal bed, No. 4 of the Indiana Geological Survey; Carboniferous (Allegheny) age, Carbondale formation. Bed is $4\frac{1}{4}$ to $5\frac{1}{2}$ feet thick; dip, southwest; cleat, indistinct. Occasional rolls are encountered. There is a middle band of bony coal and carbonaceous shale. Roof, shale; no roof coal; floor, hard, smooth clay; vertical depth to landing below entrance,

145 feet. The bed was sampled by T. Fraser and J. J. Bourquin on November 18, 1918, as described below:

Sections of coal bed in Gilmour No. 7 mine.

Section..... Laboratory No.....	A. 31298	B. 31297	C. 31295	D 31296
Roof, shale.....	<i>Ft. in.</i> 2½	<i>Ft. in.</i> a 1½	<i>Ft. in.</i> a 2	<i>Ft. in.</i> a 2
"Rash" coal.....	1 9	1 10¼	1 8	1 9
Coal.....	¼	a 1	(b)	(b)
Shale.....	2½	9	2½	.....
Coal.....	¼	(b)	a 2	a 1½
Bone.....	1 9	.....	.....	.....
Coal.....	½	.....	.....	.....
"Mother coal".....	4½	1 5½	2 3	2 3½
Coal.....	.....	.....	.....	.....
Floor, hard clay.....	4 4½	4 3¼	4 5½	4 4
Thickness of bed.....	4 4½	4 ¾	4 1½	4 ½
Thickness of coal sampled.....	.....	.....	.....	.....

a Not included in sample.

b "Sulphur" streak.

Section A (sample 31298) was cut at face of 5 room, 2 south, 18 west, south. Section B (sample 31297) was cut at face of 17 east, south, opposite 4 south. Section C (sample 31295) was cut 10 feet from face of 15 east, south. Section D (sample 31296) was cut at face of 6 room, 6 south, 15 east, south.

The ultimate analysis of a composite sample made by combining face samples 31295, 31296, 31297, and 31298 is given under laboratory No. 31299.

System of mining, room and pillar. In 1918 the coal was cut by machine and shot down by the miners, at time of going off shift, with FFF black powder. Men employed numbered 80 underground and 10 above ground. The tippie was of steel. Self-dumping cages were used. The coal was screened through shaking screens with 1¼-inch holes. The lump coal was coked at the average rate of 750 tons daily. The coal was picked on car and on shaker screens by four men. Haulage was by two electric locomotives and by mules. The three loading tracks had capacity for 30 empty and 30 loaded railroad cars. The lump coal on cars was of medium size and good appearance; the screenings on cars appeared good. The entire output was mined from advance work, and the total recovery claimed was 75 per cent. The unmined area in 1918 was approximately 1,000 acres. The probable lifetime of the mine was 5 years. The daily capacity was 1,000 tons, the daily average 750 tons, which was to be increased to 1,000 tons, and the maximum's day run 1,162 tons.

LINTON. VANDALIA No. 24 MINE.

Analyses 31278 to 31281 (p. 35). Bituminous coal, block coal field, from Vandalia No. 24 mine, a shaft mine 2 miles northwest of Linton, on the Pennsylvania R. R. Coal bed, No. 4 of the Indiana Geological Survey; Carboniferous (Allegheny) age, Carbondale formation. Bed is 3½ to 5½ feet thick; dip, irregularly southwest; cleat, indistinct. Occasional rolls are encountered. Bony coal and irregular carbonaceous shale constitute the middle band. Roof, shale and sandstone; floor, hard, smooth clay. Vertical depth to landings below entrance, 120 feet. The bed was sampled by J. J. Bourquin and T. Fraser on November 21, 1918, as described below:

Sections of coal bed in Vandalia No. 24 mine.

Section..... Laboratory No.....	A. 31279	B. 31278	C. 31280
Roof, immediate, sandstone.....	<i>Ft. in.</i> 25 0	<i>Ft. in.</i> 145 0	<i>Ft. in.</i> 20 0
Coal.....	1 6	1 4	1 6½
Bone coal.....	a ½	a ½	.....
Coal.....	6	1 3	.....
Coal and middle band.....	a 1	a 1½	a ½
Coal.....	2 2	2 ½	2 7¼
Floor, hard clay.....	.....	.....	.....
Thickness of bed.....	4 3½	4 9½	4 2
Thickness of coal sampled.....	4 2	4 7½	4 1½

a Not included in sample.

Section A (sample 31279) was cut at face of 4 north entry, 600 feet from main west entry. Section B (sample 31278) was cut at face of 4 room, 5 east entry, 5 north entry. Section C (sample 31280) was cut in 9 north west entry, opposite 15 room.

The ultimate analysis of a composite sample made by combining face samples 31278, 31279, and 31280 is given under laboratory No. 31281.

System of mining, room and pillar. In 1918 the coal was cut by machine and shot down by the miners with FF black powder, which was used also for brushing roof. Men employed numbered 65 underground and 8 aboveground. The tippie was of wood and the coal was dumped with self-dumping cages. About 50 per cent of the production was shipped as run of mine. Bar screens 12 feet long, having 1½-inch spaces, and bar screens with 4-inch openings were used. Haulage was by two electric locomotives and by mules. Two pickers were employed on the car. The three loading tracks had capacity for 30 empty and 30 loaded railroad cars. The lump coal on the cars was of medium size and had a good appearance; the appearance of screenings on the cars was good. Ninety-five per cent of the coal was mined in advance work, and a recovery of 75 per cent was claimed. The probable area to be mined from this shaft was about 400 acres. The estimated lifetime of the mine was 3 to 4 years. The capacity was 800 tons a day, the average daily output 450 tons, which was to be increased, and the maximum day's run 820 tons.

KNOX COUNTY.

SOUTH BRUCEVILLE. OLIPHANT JOHNSON No. 1 MINE.

Analyses 27660, 27661, and 27632 to 27636 (p. 35). Bituminous coal, Indiana field, from Oliphant Johnson No. 1 mine, a shaft mine 1½ miles south of Bruceville, in T. 4 N., R. 9 W., on the Vandalia R. R. Coal bed, No. 5 of the Indiana Geological Survey; Carboniferous (Allegheny) age, Carbondale formation. Bed is 5 feet 6 inches to 8 feet thick; roof, light-colored shale containing "niggerheads;" floor, carbonaceous shale and fire clay; cover at points of sampling, 420 feet. The bed was sampled by H. I. Smith and J. R. Fleming on February 14 and 15, 1917, as described below:

Sections of coal bed in No. 1 mine.

Section..... Laboratory No.....	A. 27632	B. 27633	C. 27634	D. 27660	E. 27661	F. b 27636
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	8½	1 6½	1 2½	0 10½	1 3	2 11½
Coal.....				a 1½		
"Mother coal".....	½			a ½		
Coal.....	8			a 5		
Bone.....	a 3	a 4	a 3		a 1	½
Coal.....	6½	1 6½	3½	2½	7	5½
Bone and coal.....	1½		a 2½		½	a 2½
"Sulphur".....	a Streak.	a Streak.				
Coal.....	9½	7½	1 6½	1 5		
"Sulphur".....	Streak.	a ½		Streak.		
Coal.....	1 4¾	5½	2¼	1 1½		
"Sulphur".....	Streak.			Streak.		
"Mother coal".....		½				
Coal.....	10½	8½	4½	1 5½		
"Sulphur".....	a ¾	Streak.	Streak.			
Coal.....	8¾	6	2 4	a 2½	1	½
"Sulphur".....	Streak.	Streak.			a ½	
Coal.....	1 ½	10½		1 3½	2 11	
Bone coal.....		¼	¼			
Coal.....		6¾	7			
Floor, clay.						
Thickness of bed.....	7 2¼	7 3	7 0	7 1½	5 11½	3 8
Thickness of coal sampled.....	6 10½	6 10¾	6 6½	6 4	5 10	3 5½

a Not included in sample.

b Special sample, lower half of seam.

Section A (sample 27632) was cut at face of 4 room, 4 southeast entry, 1,800 feet northeast of shaft. Section B (sample 27633) was cut at face of 14 room, 1 north entry, main east entry, 900 feet north of shaft. Section C (sample 27634) was cut in face of 2 west entry, straight south entry. Section D (sample 27660) was cut at face of 10 room, 1 southeast entry, 1,200 feet from east shaft. Section E (sample 27661) was cut at face of 8 room, 2 east entry, back north entry. Section F (sample 27636) was cut in 3 breakthrough from face, 2 west entry, straight south entry, 1,500 feet southeast of shaft.

The ultimate analysis of a composite sample made by combining face samples 27632, 27633, and 27634 is given under laboratory No. 27635.

The mine is operated on a modified panel, room and pillar system. In 1917 the coal was undercut by shortwall machines and shot down with permissible explosive, fired with fuse and No. 6 detonator. Shots were fired by miners just before they went off shift. Men employed numbered 270. Haulage was by electric locomotive. The daily average production was 2,000 tons.

PIKE COUNTY.

WINSLOW. AYRSHIRE No. 7 MINE.

Analyses 30843 and 30228 to 30231 (p. 35). Car samples of bituminous coal, bituminous coal field, from Ayrshire No. 7 mine, a shaft mine at Winslow, on the Southern R. R. Coal bed No. 5 of the Indiana Geological Survey, Carboniferous (Allegheny) age, Carbondale formation. Car samples 30228, representing 10 cars; 30229, representing 10 cars; 30230, representing 10 cars; 30231, representing 5 cars, and 30843 were secured from the loading boom, while each car was being loaded, by T. Fraser on July 26, 1918.

This mine at time of sampling was hoisting 1,200 to 1,700 tons of coal a day in mine cars on self-dumping cages. The coal was sized by shaking screens making 4-inch lump, 4 by 2-inch lump, and 2-inch screenings. When the market demanded it, the 2-inch screenings were elevated to a jig washer for cleaning. At the time of sampling the cars were loaded with the 2-inch lump. The coal was loaded into the cars by a loading boom, with little breakage. Two slate pickers were employed on the loading boom. The impurities in the coal as loaded consisted of "sulphur" in the form of thin sheets or scales, occasional pieces of white roof shale, and some bony coal.

The sample was secured by taking about 70 pounds of coal from the loading boom while each car was being loaded. In sampling large lumps a hammer was used, so that fragments might be secured from a large number of lumps, and small amounts were taken at frequent intervals. The sample was crushed on a clean concrete floor, mixed, and reduced.

SULLIVAN COUNTY.

DUGGER. VANDALIA No. 10 MINE.

Analyses 31262 to 31267 (p. 36). Bituminous coal, bituminous coal field, from Vandalia No. 10 mine, a shaft mine, 265 feet deep, $1\frac{1}{2}$ miles southwest of Dugger, on the Pennsylvania R. R. Coal bed, No. 4, of the Indiana Geological Survey; Carboniferous (Allegheny) age, Carbondale formation. Bed is $4\frac{1}{2}$ to 6 feet thick; dip, southwest, with cleat. Occasional rolls are encountered. The bed contains a carbonaceous shale middle band ranging from a streak to unminable thickness. Roof, sandstone or gray shale; floor, hard, gray clayey shale; vertical depth from surface to points of sampling, 200 to 280 feet. The bed was sampled by J. J. Bourquin and T. Fraser on November 21, 1918, as described below:

Sections of coal bed in Vandalia No. 10 mine.

Section.....	A. 31262	B. 31266	C. 31264	D. 31265	E. 31263
Laboratory No.....					
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
"Rash".....	a 2	a 2	2		a 1 $\frac{1}{2}$
Coal, bright.....	1 3	a 1 3	1 6		2 10 $\frac{1}{2}$
"Mother coal" and "sulphur".....	a $\frac{1}{2}$	a $\frac{1}{2}$	$\frac{1}{4}$		
Coal.....	7 $\frac{1}{2}$	a 7 $\frac{1}{2}$	11	2 9 $\frac{1}{2}$	
"Mother coal".....	a 3 $\frac{1}{2}$	3 $\frac{1}{2}$			
Coal.....	3 $\frac{1}{2}$	a 3 $\frac{1}{2}$			
"Sulphur" or bony coal.....	1 $\frac{1}{8}$	a $\frac{1}{8}$		2	
Coal.....	11	a 11		1 3 $\frac{1}{2}$	
Middle band.....	1	a 1	1	$\frac{1}{4}$	a 1 $\frac{1}{2}$
Coal.....	1 3 $\frac{1}{2}$	a 1 3 $\frac{1}{2}$	2 3 $\frac{1}{2}$	11 $\frac{1}{4}$	2 4
Floor, hard clay.....					
Thickness of bed.....	4 11	4 11	4 11 $\frac{1}{2}$	5 2 $\frac{1}{2}$	5 5 $\frac{1}{2}$
Thickness of coal sampled.....	4 5 $\frac{1}{2}$	3 $\frac{1}{2}$	4 11 $\frac{1}{2}$	5 2 $\frac{1}{2}$	5 2 $\frac{1}{2}$

a Not included in sample.

Section A (sample 31262) was cut at face of main north entry, opposite 15 east entry. Section B (sample 31266) was cut at face of main north entry, opposite 15 east entry. Section C (sample 31264) was cut at face of 20 room, 14 north entry, 14 east, north entry. Section D (sample 31265) was cut opposite 14 room, 2 south entry, 3 east entry, 3 south entry. Section E (sample 31263) was cut at face of 3 west entry, 2 south entry, 500 feet from 1 south entry.

The ultimate analysis of a composite sample made by combining face samples 31262, 31263, 31264, and 31265 is given under laboratory No. 31267.

System of mining, room and pillar. In 1918 the coal was cut by machine and shot down with FF black blasting powder by shot firers at 3 p. m., after the miners had left the mine. Men employed numbered 180 underground and 14 aboveground. The tippie was of wood with automatic dump cage. The proportion of output shipped as run of mine varied. Bar screens 12 feet long, with $1\frac{1}{4}$ -inch spaces, were used, and one-third of coal going to screens passed through. Haulage was by three electric locomotives and by mules. Two pickers were employed on the cars. The three loading tracks had a capacity for 40 empty and 40 loaded railroad cars. The coal on the cars consisted of large lumps; the lumps and screenings on the car had an excellent appearance. All the coal was mined in advance work, and the recovery claimed was 75 per cent. The unmined area consisted of 500 or more acres. The probable lifetime of the mine was six years. The daily capacity was 1,200 tons, the average output 1,100 tons, and the maximum day's run 1,800 tons. The daily output was to be increased.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 85, pp. 37, 199, and Bull. 123, pp. 37, 184.

DUGGER. VANDALIA No. 22 MINE.

Analyses 31274 to 31277 (p. 36). Bituminous coal, bituminous coal field, from Vandalia No. 22 mine, a shaft mine $2\frac{1}{2}$ miles southwest of Dugger, on the Pennsylvania R. R. Coal bed, No. 4, of the Indiana Geological Survey; Carboniferous (Allegheny) age, Carbondale formation. Bed is 2 to 6 feet thick; dip, in southwest direction. The bed contains a middle band of coal and shale. Rolls are present, but not frequent. Roof, shale of light color; floor, fairly smooth and hard clay; cover, at points of sampling, 290 to 300 feet. The bed was sampled by J. J. Bourquin and T. Fraser on November 14, 1918, as described below:

Sections of coal bed in Vandalia No. 22 mine.

Section..... Laboratory No.....	A. 31275	B. 31276	C. 31274
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
"Rash" coal.....	<i>a</i> $\frac{1}{2}$	.....	<i>a, b</i> $3\frac{1}{2}$
Coal.....	1 2	1 10	1 $3\frac{1}{2}$
"Sulphur".....	Lens at side.	$\frac{1}{4}$	.....
Coal.....	1 7	1 2	.....
Middle band or carbonaceous shale parting.....	<i>a</i> $2\frac{1}{2}$	<i>a</i> 1	<i>a</i> 2
Coal.....	1 $2\frac{1}{2}$	9	1 $2\frac{1}{4}$
Floor, hard clay.....			
Thickness of bed.....	4 $2\frac{1}{2}$	3 $10\frac{1}{4}$	2 $11\frac{1}{4}$
Thickness of coal sampled.....	3 $11\frac{1}{2}$	3 $9\frac{1}{4}$	2 $5\frac{1}{4}$

a Not included in sample.

b Not regular.

Section A (sample 31275) was cut at face of main air course. Section B (sample 31276) was cut at face of 1 west entry, main north entry. Section C (sample 31274) was cut at face of main south entry.

The ultimate analysis of a composite sample made by combining face samples 31274, 31275, and 31276 is given under laboratory No. 31277.

System of mining, room and pillar, in panels. At time of sampling the coal was cut by machine and shot down at any time by the mine boss with permissible explo-

sive, which was used also to brush roof or floor. Men employed numbered 16 underground and 4 aboveground. The tippie was of wood; a temporary car dump was employed. Haulage was by mules. One picker was employed on the cars. The two loading tracks had capacity for 20 empty and for many loaded railroad cars. The lump coal on cars consisted of medium lumps and had a good appearance. The entire production of coal was taken out in advance work. The unmined area consisted of 1,000 acres. The estimated lifetime of the mine was 10 years. The capacity of the mine was 30 tons a day, the daily average 30 tons, and the maximum day's run 50 tons. The daily output was to be increased shortly to 200 tons and was eventually to reach 800 tons. The mine had been abandoned some years before and was being reopened. The entries at time of sampling were being driven through low coal to develop adjacent higher and better coal.

DUGGER. AYRDALE NO. 27 MINE.

Analyses 31290 to 31294 (p. 36). Bituminous coal, bituminous coal field, from Ayrdale No. 27 mine, a shaft mine 3 miles north of Dugger, on the Southeastern R. R., with Chicago, Indianapolis & Louisville connections. Coal bed, No. 4, of the Indiana Geological Survey; Carboniferous (Allegheny) age, Carbondale formation. Bed is 4 to 5½ feet thick; dip, varying; cleat, indistinct. Occasional rolls are encountered. A middle band of carbonaceous shale is present. Roof, gray shale, no roof coal; floor, hard, smooth clay; cover at points of sampling, 190 to 200 feet. The bed was sampled by T. Fraser and J. J. Bourquin on November 19, 1918, as described below:

Sections of coal bed in Ayrdale No. 27 mine.

Section..... Laboratory No.....	A. 31290	B. 31291	C. 31292	D. 31293
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 10½	1 10½	2 0	2 4
Carbonaceous shale.....	a ½	a 2½	a ½	a 2
Coal.....	a ¾	a 3	2 3½	2 4
Shale.....	a ½	Streak.		
Coal.....	4½	1		
"Sulphur".....	a ¼	¼		
Coal.....	1 11¼	1 9		
Floor, hard clay.				
Thickness of bed.....	4 4½	4 21¼	4 4	4 10
Thickness of coal sampled.....	4 3	3 11¾	4 3½	4 8

a Not included in sample.

Section A (sample 31290) was cut 50 feet from 2 east entry, 5 northeast entry. Section B (sample 31291) was cut 50 feet from 3 south entry, 3 southeast entry. Section C (sample 31292) was cut at face of 23 room, 5 north entry, east. Section D (sample 31293) was cut at face of 5 room, 1 west entry, 1 north entry, 3 east, north entry.

The ultimate analysis of a composite sample made by combining face samples 31290, 31291, 31292, and 31293 is given under laboratory No. 31294.

System of mining room and pillar. In 1918 the coal was cut by machine and shot down with FF black powder by miners at 3 p. m., FF black powder being used for brushing roof or floor. Men employed numbered 150 underground and 14 aboveground. The tippie was of wood with self-dumping cage. About 50 per cent of the coal was shipped as run of mine. The coal was screened over shaking screens with holes 1¼ inches, 2½ inches, and 4 inches in diameter. The lump coal was coked at the average daily rate of 350 tons. Haulage was by mules and by two electric locomotives. Two pickers were employed on the cars. The four loading tracks had capacity for 40 empty and 40 loaded railroad cars. The appearance of the coal, medium lumps, and of the screenings on the cars was good. The entire production was mined in advance work, and the total recovery claimed was 75 per cent. The unmined area consisted of

about 500 acres. The estimated lifetime of the mine was 6 years. The capacity of the mine was 1,200 tons a day, the average daily production 700 tons, and the maximum day's run 1,700 tons. The output was to be doubled.

SULLIVAN. VANDALIA No. 17 MINE.

Analyses 31268 to 31273 (p. 37). Bituminous coal, bituminous coal field, from Vandalia No. 17 mine, a shaft mine, 140 feet deep, 5 miles east of Sullivan, on the Pennsylvania R. R. Coal bed, No. 6 of the Indiana Geological Survey; Carboniferous (Allegheny) age; Carbondale formation. Bed is 5 to 6 feet thick and dips irregularly in southwest direction, with cleat running north and south. Characteristic "clay veins" are occasionally encountered. Two thin shale partings occur near the center and one near the bottom of the coal. Roof, shale, good quality; floor, smooth, soft clay; cover at points of sampling, 140 feet. The bed was sampled by T. Fraser and J. J. Bourquin on November 15, 1918, as described below:

Sections of coal bed in Vandalia No. 17 mine.

Section.....	A. 31268	B. 31270	C. 31269	D. 31271	E. 31272
Laboratory number.....					
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal and "sulphur".....	$\frac{1}{2}$	$a\ 1\frac{1}{2}$		$a\ 2$	
Coal.....	1 $6\frac{1}{2}$	8 $\frac{1}{4}$	1 1	1 $6\frac{1}{2}$	11
Shale and "sulphur".....	$a\ 2\frac{1}{2}$	Streak.	Streak.		Streak.
Coal.....	$4\frac{1}{2}$	1 0	7		8 $\frac{1}{2}$
Shale.....	$a\ \frac{1}{2}$	$a\ \frac{3}{4}$	$a\ 1\frac{1}{2}$	$a\ 1$	$a\ \frac{1}{2}$
Coal.....	1 0	5 $\frac{1}{2}$	6 $\frac{1}{2}$	$a\ 3$	5
Coal, shale and "sulphur".....	$a\ 1$	$a\ \frac{3}{4}$	1	$a\ 3$	$a\ 1$
Coal.....	1 1	2 2	2 1	2 0	2 0
Shale.....	$a\ 1$	$\frac{1}{2}$	1 $\frac{1}{2}$	$a\ 3$	$a\ 1$
Coal.....	4	8	5	9 $\frac{1}{2}$	10 $\frac{1}{2}$
Bottom coal.....	4 $\frac{1}{2}$	$a\ 4\frac{1}{4}$	2 $\frac{1}{2}$		
Floor, clay.					
Thickness of bed.....	5 2	5 $7\frac{1}{2}$	5 3	5 4	5 $1\frac{1}{2}$
Thickness of coal sampled.....	4 9	5 $\frac{1}{4}$	5 $1\frac{1}{2}$	4 7	4 11

a Not included in sample.

Section A (sample 31268) was cut at face of 1 room, 5 north, east, 1,000 feet from shaft bottom. Section B (sample 31270) was cut at face of 13 room, 4 south, east entry.

Section C (sample 31269) was cut at face of 9 room, 2 south, west. Section D (sample 31271) was cut opposite 13 room, at face of 3 north, east. Section E (sample 31272) was cut in face, 2 west, 2 north, west.

The ultimate analysis of a composite sample made by combining face samples 31268, 31269, 31270, 31271, and 31272 is given under laboratory No. 31273.

System of mining room and pillar in panels. In 1918 the coal was cut by machine and shot down by miners, at time of leaving the mine, with FF black blasting powder. The tippie was of steel, and the coal was dumped from automatic dump cages to a conveyor, then to picking tables, where two men removed the impurities, then to bar screens 12 feet long with 1 $\frac{1}{4}$ -inch openings. Haulage was by two electric locomotives and by mules. The three loading tracks had capacity for 50 empty and many loaded railroad cars. The lump coal on cars was in medium lumps and had a good appearance. All the coal was taken out in advance work, and a total recovery of 75 per cent was claimed. The probable area to be mined from this opening was 1,500 or more acres. The estimated lifetime of the mine was 15 years. The daily capacity of the mine was 2,000 tons, the daily average production 900 tons, and the maximum day's run 1,200 tons. The daily output was to be increased.

SULLIVAN. VANDALIA No. 28 MINE.

Analyses 31282 to 31285 (p. 37). Bituminous coal, bituminous coal field, from Vandalia No. 28 mine, a shaft mine 7 miles east of Sullivan, on the Chicago, Terre Haute & Southeastern R. R., with Chicago, Indianapolis & Louisville connections.

Coal bed, No. 4 of the Indiana Geological Survey; Carboniferous (Allegheny) age; Carbondale formation. Bed is 5 to 6½ feet thick. The dip varies, running southwest, with indistinct cleat. Occasional rolls are encountered. Roof, shaly sandstone, with no roof coal; floor, smooth hard clay; cover at points of sampling, 211 feet. The bed was sampled by J. J. Bourquin and T. Fraser on November 20, 1918, as described below:

Sections of coal bed in Vandalia No. 28 mine.

Section..... Laboratory No.....	A. 31283	B. 31284	C. 31282
Roof, sandy shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
“Rash” coal.....	1		
Coal.....	3 0	2 11½	3 1
Carbonaceous shale.....	^a 2½	^a 3	^a 4
Coal.....	5½	9	2 7
“Mother coal” and “sulphur”	Streak.	4	
Coal.....	2 4	2 0	
Floor, smooth hard clay.			
Thickness of bed.....	6 1	5 11¾	6 0
Thickness of coal sampled.....	5 11½	5 8¾	5 8

^a Not included in sample.

Section A (sample 31283) was cut 100 feet north of air shaft. Section B (sample 31284) was cut at face of 1 east entry, south, 60 feet from air shaft. Section C (sample 31282) was cut 100 feet south of air shaft.

The ultimate analysis of a composite sample made by combining face samples 31282, 31283, and 31284 is given under laboratory No. 31285.

In 1918 this mine was new; it was to be operated on the room-and-pillar system. Permissible explosive was used for shooting the coal. Men employed numbered 19 underground and 5 aboveground. The coal was being hoisted from air shaft, and a steel tippie was being erected. No screens had been installed. Haulage was by mules. There was one temporary loading track. The unmined area consisted of approximately 2,000 acres. The estimated lifetime of the mine was 20 years. A large part of the coal was to be coked. The daily average production at time of sampling was 50 tons, which was to be increased to 2,000 tons.

VERMILION COUNTY.

CLINTON. CLINTON No. 4 OR CROWN HILL No. 4 MINE.

Analyses 31257 to 31261 (p. 37). Bituminous coal, bituminous coal field, from Clinton or Crown Hill No. 4 mine, a shaft mine 3½ miles southwest of Clinton, on the Chicago & Eastern Illinois R. R. Coal bed, No. 4 of the Indiana Geological Survey; Carboniferous (Allegheny) age; Carbondale formation. Bed is 3 to 5½ feet thick; dip, varying; cleat, indistinct. Faults and rolls are encountered. Roof, good shale; floor, hard, smooth clay; cover at points of sampling, 205 feet. The bed was sampled by T. Fraser on November 25, 1918, as described below:

Sections of coal bed in Clinton No. 4 mine.

Section..... Laboratory No.....	A. 31258	B. 31257	C. 31259	D. 31260
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 10½	1 7	2 6	2 6
Bone.....	½	1	^a 1½	
Coal.....	9½	11	2 4	
Bone and shale parting.....	1½			^a 1
Shale, bone, and coal.....		^a 4		
Coal.....	2 4½	2 1		1 6
Floor, hard clay.				
Thickness of bed.....	5 2½	5 0	4 11½	4 1
Thickness of coal sampled.....	5 2½	4 8	4 10	4 0

^a Not included in sample

Section A (sample 31258) was cut at face of 1 room, 15 south entry, 16 west entry. Section B (sample 31257) was cut at face of 8 south entry. Section C (sample 31259) was cut at face of 3 east entry, 8 south entry. Section D (sample 31260) was cut at face of 7 room, 1 north entry, main west entry.

The ultimate analysis of a composite sample made by combining face samples 31257, 31258, 31259, and 31260 is given under laboratory No. 31261.

System of mining, room and pillar. In 1918 the coal was cut by machine and shot down with black powder by two shot firers at 3.15 p. m., after the miners had left the mine; black powder was used for brushing roof and floor. Men employed numbered 130 underground and 14 above ground. The tipple was of steel, and self-dumping cages were used. Haulage was by eight electric locomotives. The coal was screened in shaking screens with holes $1\frac{1}{4}$, $2\frac{1}{2}$, and 4 inches in diameter. All the coal was taken out in advance work, and a recovery of 75 per cent was claimed. The capacity of the mine was 1,000 tons a day, the daily average production 800 tons, and the maximum day's run 1,000 tons.

VIGO COUNTY.

COAL BLUFF. VIGO 74 MINE.

Analyses 26118 to 26124 (p. 37). Bituminous coal, bituminous coal field, from Vigo 74 mine, a shaft mine 1 mile northwest of Coal Bluff, on the Big Four R. R. Coal bed, Minshall; Carboniferous (Allegheny) age, Carbondale formation. Bed is 4 to 5 feet thick; dip, southwest; roof, shale; floor, soft clay; cover at points of sampling, 140 to 180 feet. The bed was sampled by H. I. Smith on September 2, 1916, as described below:

Sections of coal bed in No. 74 mine.

Section..... Laboratory No.....	A. 26118	B. 26119	C. 26120	D. 26121	E. 26122	F. 26123
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bony coal and "sulphur".....	<i>a</i> 2	<i>a</i> 2 $\frac{1}{2}$	<i>a</i> 2	<i>a</i> 2	<i>a</i> 1 $\frac{1}{2}$	<i>a</i> 2 $\frac{1}{2}$
Coal.....	2	2 $\frac{1}{4}$	5 $\frac{1}{4}$	2	6 $\frac{1}{4}$	2
Coal with "sulphur" streaks.....			1 $\frac{1}{4}$			
Coal.....			8			
"Sulphur" and "mother coal".....		<i>a</i> 1 $\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	
Coal.....		2	1	3	2 $\frac{1}{4}$	
Bony coal.....	1 $\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	<i>a</i> 1 $\frac{1}{2}$
Coal.....	2 $\frac{1}{2}$	2	2	1	11	<i>a</i> 2 $\frac{1}{2}$
Bony coal.....	1 $\frac{1}{2}$	<i>a</i> 2	<i>a</i> 2	<i>a</i> 1 $\frac{1}{4}$	<i>a</i> 1 $\frac{1}{2}$	<i>a</i> 1 $\frac{1}{2}$
Coal.....	<i>a</i> 2	1 $\frac{1}{2}$				2
Floor, clay.						
Thickness of bed.....	4	9 $\frac{1}{2}$	4	8 $\frac{1}{2}$	5	1 $\frac{1}{2}$
Thickness of coal sampled.....	5 $\frac{1}{2}$	4	2 $\frac{1}{2}$	4	9 $\frac{1}{2}$	4

a Not included in sample.

Section A (sample 26118) was cut at face of 12 east south entry, near mouth of 14 room. Section B (sample 26119) was cut at face of 6 room, 100 feet in by 14 west south entry. Section C (sample 26120) was cut 50 feet in by 16 east entry, on main south entry. Section D (sample 26121) was cut at face of 34 room, 7 west entry, 200 feet from entry. Section E (sample 26122) was cut at 2 breakthrough, 6 room, 3 north entry, 7 west entry. Section F (sample 26123) was cut at face of 12 east south entry, near mouth of 14 room (same as section A).

The ultimate analysis of a composite sample made by combining face samples 26119, 26120, 26121, 26122, and 26123 is given under laboratory No. 26124.

System of mining, room and pillar. In 1916 the coal was shot from the solid, but some time after the samples were taken mining machines were installed. Black blasting powder was used to shoot down the coal. The tipple was of wood. At time

of sampling the output was 400 tons a day, all of it from advance workings. Barscreens with 1½-inch spaces were used. Haulage was by mules and main and tail rope. The coal was picked on cars by two men. The two loading tracks had capacity for 25 empty and 50 loaded railroad cars. The appearance of the coal on the cars was very blocky and bright. The estimated lifetime of the mine in 1916 was 10 years. The capacity of the mine was 1,200 tons a day, and the maximum day's run over 1,100 tons.

LIGGETT. VANDALIA No. 82 MINE (No. 3 Bed).

Analyses 31286 to 31289 (p. 37). Bituminous coal, bituminous coal field, from Vandalia No. 82 mine, a shaft mine, 467 feet deep, at Liggett, 5 miles west of Terre Haute. Two beds are worked, No. 3 and No. 5, but No. 3 only was investigated. Coal bed, Carboniferous (Allegheny) age, Carbondale formation. Bed is 5 feet 4 inches to 6 feet 6 inches thick; dip, irregular. Occasional faults are encountered. There is a middle band of shale, coal, and "sulphur," also numerous streaks of "sulphur." Roof, shale; floor, smooth, hard clay; cover at points of sampling, 460 feet. No. 3 bed was sampled by J. J. Bourquin and T. Fraser on November 22, 1918, as described below:

Sections of coal bed in Vandalia No. 82 mine.

Section.....	A.	B.	C.
Laboratory No.....	31286	31288	31287
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2½	2¾	¾
"Sulphur".....	Streak.	¾	Streak.
Coal.....	7	1 1½	2 2½
Carbonaceous shale.....	¾		
Coal.....	1½		
"Sulphur".....	Streak.	Streak.	¾
Coal.....	7	10½	2
"Sulphur".....	¾	Streak.	¾
Coal.....	9¾	6¾	¾
Shale and "sulphur".....	¾	¾	
Coal.....	1 0	9	
Shale and coal.....	a 1 1¼	a 1 0	a 1 2
Coal.....	1 2	1 9	1 7¾
Floor, hard clay.			
Thickness of bed.....	5 7¾	6 4	6 ¼
Thickness of coal sampled.....	4 6¾	5 4	4 10¼

a Not included in sample.

Section A (sample 31286) was cut at face of 4 south entry. Section B (sample 31288) was cut at face of 2 west entry, 900 feet from shaft. Section C (sample 31287) was cut at face of main east entry.

The ultimate analysis of a composite sample made by combining face samples 31286, 31287, and 31288 is given under laboratory No. 31289.

System of mining, room and pillar. In 1918 the coal was cut by machine and shot down with permissible explosive by shot firers at any time during the shift. Permissible explosive and dynamite were used for brushing roof or floor. Men employed numbered 8 underground and 3 aboveground. The temporary tippie was of wood. All of the coal was shipped as run of mine. At time of sampling no steps had been taken toward preparing coal for the market. Haulage was by mules. The entire production was mined in the advance work and a recovery of 75 per cent was claimed. The mine was just being developed.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 123, pp. 38, 187.

KANSAS.

CHEROKEE COUNTY.

STONE CITY. MAYER No. 9 MINE.

Analyses 27222 to 27225 (p. 38). Bituminous coal, Kansas field, from Mayer No. 9 mine, a shaft mine, 155 feet deep, about ½ mile northeast of Stone City and 3½ miles northeast of West Mineral, on a spur off the main line of the Missouri, Kansas & Texas R. R. Coal bed, Weir-Pittsburg, known locally as Cherokee; Carboniferous age (Pennsylvanian), Cherokee shale. Thickness of bed averages about 3½ feet. Roof, hard blue shale; floor, pyritiferous fire clay, locally called "blackjack"; cover at points of sampling, 155 feet. The bed was sampled by J. J. Forbes and J. F. Davies on December 28, 1916, as described below:

Sections of coal bed in Mayer No. 9 mine.

Section..... Laboratory No.....	A. 27222	B. 27223	C. 27224	D. 27225
Roof, hard blue shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
"Rash".....	1			1
Coal.....	11			11
Slate band.....	$\frac{1}{8}$			$\frac{1}{8}$
Coal.....	4			4
"Mother coal".....	$\frac{2}{8}$			$\frac{2}{8}$
Coal.....	1 1 $\frac{5}{8}$	0 .85	0 .85	1 1 $\frac{5}{8}$
"Sulphur" band.....	$\frac{5}{8}$	.1	.1	$\frac{5}{8}$
Coal.....	1 1	2 .73	2 .73	1 1
Floor, "blackjack".				
Thickness of bed.....	3 7	3 .68	3 .68	3 7
Thickness of coal sampled.....	3 7	3 .68	3 .68	3 7

Section A (sample 27222) was cut at face of 1 east entry, north entry. Section B sample (27223) was cut in last crosscut between straight and back north entries. Section C (sample 27224) was cut in last crosscut between straight and back north entries. Section D (sample 27225) was cut at 1 east entry, north entry.

System of mining, room and pillar. In 1916, FF black powder was used in blasting down the coal, and 40 per cent dynamite was used in cutting through horsebacks; shooting off the solid was the method employed exclusively. The coal was undercut with mining machines. About 73 men were employed at the mine. The coal was conveyed to the shaft bottom by mules. At time of sampling the daily production was 300 tons.

CRAWFORD COUNTY.

EDISON. WEAR No. 21 MINE.

Analyses 30293 to 30295 (p.38). Bituminous coal, Kansas field, from Wear No. 21 mine, a shaft mine in SW. ¼ of sec. 13, T. 29 S., R. 24 E., about 2 miles east of Radley and ½ mile north of Edison, having railroad connections with the Santa Fe, Missouri Pacific, and St. Louis & San Francisco Railroads. Coal bed, Weir-Pittsburg, locally known as the Cherokee; average thickness, about 3 feet 4 inches of clean coal. Roof poor, a rather soft gray limy shale, brushed on entries to a height of about 6 feet; floor, fire clay, 8 feet thick; cover at points of sampling, 200 feet.

The bed was sampled by J. J. Rutledge on March 8, 1918, as described below:

Sections of coal bed in Wear No. 21 mine.

Section.....	A.	B.
Laboratory No.....	30293	30294
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	14	14
"Sulphur".....	a 2	a 2
Coal.....	2 $\frac{3}{4}$	2 $\frac{3}{4}$
"Sulphur".....	a $\frac{1}{2}$	a $\frac{1}{2}$
Coal.....	21 $\frac{1}{2}$	21 $\frac{1}{2}$
Floor, fire clay.		
Thickness of bed.....	3 4 $\frac{3}{4}$	3 4 $\frac{3}{4}$
Thickness of coal sampled.....	3 2 $\frac{1}{4}$	3 2 $\frac{1}{4}$

a Not included in sample.

Section A (sample 30293) was cut at face of 1 room, 1 stub north, 5 west, main east. Section B (sample 30294) was cut at face of 1 room, 1 stub north, 5 west, 1 north, main east.

The ultimate analysis of a composite sample made by combining face samples 30293 and 30294 is given under laboratory No. 30295.

System of mining, room and pillar, with double entry. In 1918 the coal was blasted off the solid by FF black blasting powder; dynamite was used for brushing the roof. All shots were fired by two shot firers after all other persons had left the mine. The tipple had a wood frame covered with corrugated iron. None of the coal was shipped as run of mine. Sizes of coal, lump, nut, and slack. There was track capacity for 30 empty and 30 loaded railroad cars. Haulage was by mules. The unmined area comprised 160 acres. The probable lifetime of the mine was four years. The capacity of the mine at time of sampling was 800 tons a day, and the average daily output was equal to the capacity.

KENTUCKY.

CHRISTIAN COUNTY.

MANNINGTON. WILLIAMS MINE.

Analyses 70506 to 70508 (p. 38), mine samples. Analyses 70509 to 70511 (p. 39), tipple samples. Bituminous coal, western Kentucky field, from Williams mine, a slope mine at Mannington, Ky., on the Louisville & Nashville R. R. Coal bed known locally as the Empire; Carboniferous age, Pottsville group. Bed is about 4 feet thick. The roof and floor are shale, which readily parts from the coal. The mine was sampled by N. H. Snyder on January 28, 1919, as described below:

Sections of coal bed in Williams Mine.

Section.....	A.	B.	C.
Laboratory No.....	70506	70507	70508
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	3 $\frac{3}{8}$	a 1 $\frac{3}{4}$	a 1
Shale.....			a 2 $\frac{1}{2}$
Bone.....			a 1
Shale parting.....		a $\frac{1}{2}$	a 3 $\frac{3}{4}$
Coal.....	1	8	10
Shale parting.....		a $\frac{1}{8}$	a $\frac{1}{8}$
Coal.....	2 1 $\frac{1}{2}$	2 4	2 5 $\frac{3}{4}$
Shale parting.....		a $\frac{1}{8}$	a $\frac{1}{8}$
Coal.....	6	9	4
Floor, shale.			
Total thickness of bed.....	4 3 $\frac{3}{4}$	3 11 $\frac{1}{2}$	4 1 $\frac{1}{4}$
Bed sampled.....	4 3 $\frac{3}{4}$	3 9 $\frac{1}{4}$	3 7

a Not included in sample.

Section A (sample 70506) was cut from face of 1 room, 2 north entry, 80 feet from entry. Section B (sample 70507) was cut from face of 4 room, 2 west entry, 110 feet from entry. Section C (sample 70508) was cut from face of 1 south entry.

System of mining, room and pillar. At time of sampling the coal was shot from the solid by FF blasting powder. Men employed numbered 42 underground and 5 on surface. The coal was shipped as run of mine. Haulage was done by mules in the mine and by steam on the slope. The coal was picked on cars by two pickers. At time of sampling the mine had been in operation one year. The capacity of the mine was 200 tons, which were being shipped daily. In September, 1919, the capacity of the mine was 300 tons a day, at which time there were 55 men underground and 7 on surface. A new tipple was built.

Three tipple samples (70509, 70510, and 70511) were taken at the Williams mine by N. H. Snyder on January 23 to 27, 1919. The coal was loaded directly into the railroad cars from a wooden tipple. Samples were accumulated by taking successive large shovelfuls of coal from the railroad cars at intervals after the mine cars had been dumped and the two pickers had cleaned the coal. Samples were accumulated in a galvanized-iron bucket and carried to a steel plate 4 by 5 feet, with two sides flanged, and there crushed with a tamper and sledge. Crushing, mixing, and quartering were done by the standard method. Three 1,000-pound samples were taken in this way and reduced to 3-pound mailing-can size for laboratory.

LETCHER COUNTY.

FLEMING. ACME MINE.

Analyses 29845 to 29847 (p. 39). Bituminous coal, eastern Kentucky field, from Acme, a drift mine, 1 mile west of Fleming, on the Louisville & Nashville R. R. Coal bed, Elkhorn; Carboniferous age, Pottsville group. Small rolls or horsebacks are encountered, but are not large enough to present much trouble in mining. In this district the bed lies about 1,500 feet above sea level. Bed is 5 to 7 feet thick. Dip runs northwest, with cleat. Roof, hard smooth shale; floor, smooth hard shale; conditions of roof and floor, very good. The bed was sampled by J. M. Webb and J. J. Bourquin on January 16, 1918, as described below:

Sections of coal bed in Acme mine.

Section.....	A.	B.
Laboratory No.....	29845	29846
Roof, hard smooth black shale.	<i>Ft. in.</i>	<i>Ft. In.</i>
Coal.....	1 11 ³ / ₄	1 10
Bone.....	¹ / ₂	
Muck and coal.....		3
Coal.....	2 11 ¹ / ₄	3 5
Floor, hard smooth shale.		
Thickness of bed.....	4 11 ¹ / ₂	5 6
Thickness of coal sampled.....	4 11 ¹ / ₂	5 6

Section A (sample 29845) was taken at 16 room neck, 20 feet from face of 3 entry. Section B (sample 29846) was taken 20 feet from face of 2 entry, 10 feet outby 15 room.

The ultimate analysis of a composite sample made by combining samples 29845 and 29846 is given under laboratory No. 29847.

System of mining, room and pillar. No mining machines were used, and all the coal was blasted off the solid and shot down with FFF black powder by two shot firers after the miners left at 11.00 a. m. and in the evening. A little permissible explosive was used to brush the roof or floor. Men employed numbered 45 underground and 15 above ground. The coal was dumped over a wooden tipple and down a chute

212 feet long, lined with sheet iron, with deflectors every 10 feet. All the coal was shipped as run of mine. There were no pickers. The coal consisted of medium-sized lumps and was fairly bright. In 1918 all the coal was taken out in the advance work. The unmined area consisted of 50 acres. The estimated lifetime of the mine was 8 years. Haulage was by mules. There was one loading track, with capacity for 10 empty and 12 loaded railroad cars. The capacity of the mine in 1917 was 350 tons a day, the average daily output 300 tons, and the maximum day's run 350 tons.

WEBSTER COUNTY.

CLAY. WEST KENTUCKY No. 7 MINE.

Analyses 30747 to 30751 (p. 39). Bituminous coal, Western Kentucky field, from West Kentucky No. 7 mine, a shaft mine 1 mile west of Clay, on the Illinois Central and Louisville & Nashville Railroads. Coal bed, No. 12 of the Kentucky Geological Survey; Carboniferous age, Pottsville group. Bed varies from 6 feet 6 inches to 8 feet in thickness and dips 3° north, north 17° east. Very few rolls or horsebacks are encountered. Main roof, "soapstone" or shale 4 or more feet thick, which disintegrates readily where exposed to air; top coal, from 1 foot to 2 feet thick, is left in place; floor, hard, smooth fire clay. The bed was sampled by W. B. Plank on June 17, 1918, as described below:

Sections of coal bed in West Kentucky No. 7 mine.

Section..... Laboratory No.....	A. 30749	B. 30748	C. 30747	D. 30750
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, "soapstone" and coal.....	^a 1 4	^a 1 6	^a 1 6	^a 2 0
Coal.....	1 1	2 10	10½	2 8
"Mother coal".....	½			
"Sulphur".....			½	
Coal.....	1 2		1 ½	
Bony coal.....	1½	½	1	1
Coal.....	2½	2	3½	3
Bony coal.....	^a 3	^a 1	^a 1	^a 2½
Coal.....	2 4½	2 8	2 2	2 6½
Bony coal.....				^a 3
Floor, fire clay.....				
Thickness of bed.....	6 6¾	7 3½	6 2	8 0
Thickness of coal sampled.....	4 10¼	5 8	4 6	5 5½

^a Not included in sample.

Section A (sample 30749) was cut at the face of 10 room, 2 south entry, 7 right east dip, 100 feet from entry, 3,000 feet east of shaft. Section B (sample 30748) was cut at the face of 24 room, 3 left entry, east dip, 250 feet from entry, 1,400 feet northeast of shaft. Section C (sample 30747) was cut at the face of 11 room, 14 south entry, 2 left entry, main rise, 150 feet from entry, 5,100 feet southeast of shaft. Section D (sample 30750) was cut at the face of 3 south entry, 3 left entry, main rise, 220 feet from 3 left entry, 2,800 feet south of shaft.

The ultimate analysis of a composite sample made by combining equal amounts of samples 30747, 30748, 30749, and 30750 is given under laboratory No. 30751.

The mine is developed on the double-entry, room-and-pillar, panel plan. In 1918 cutting was done by machine in the coal and shots were fired at night by the shot firers with permissible explosives. Men employed numbered 140 underground and 15 above-ground. The tippie was of steel, equipped with picking table, where impurities were removed by four to six pickers. Self-dumping cages were used, and the coal was sized on shaking screens, with holes 2½ and 1½ inches in diameter, into slack, pea, egg, nut, and lump sizes. Thirty per cent of the coal going to screens passed through. The lump coal went to a picking conveyor, which delivered to the railroad car. Very little

of the output was shipped as run of mine. Haulage was by four electric locomotives and by mules. The four loading tracks had capacity for 50 empty and 50 loaded railroad cars. The lump coal and screenings on the cars had a good appearance. Forty-one per cent of the coal was taken in advance work, and the recovery was 46 per cent. The unmined area consisted of approximately 600 acres. The estimated lifetime of the mine was about 8 years. The daily average output was about 1,000 tons and the maximum day's production 2,250 tons. It was planned to increase the daily production to 1,800 tons.

MARYLAND
ALLEGANY COUNTY.

ALLEGANY. TYSON No. 3 MINE.

Analyses 26506 (p. 39). Semibituminous coal, Georges Creek field, from Tyson No. 3 mine, 1¼ miles northeast of Allegany, on the Cumberland & Pennsylvania R. R. Coal bed, Tyson; Carboniferous age, Monongahela formation. Roof and floor, shale; cover at point of sampling, 100 feet. The bed was sampled in 3 room, 2 right, by the Maryland Geological Survey on June 23, 1916, and showed coal 3 feet 11½ inches thick, with no impurities to be discarded in mining. The average daily production at time of sampling was 75 to 100 tons.

BARRELVILLE. BOND MINE.

Analyses 26985 (p. —). Semibituminous coal, Georges Creek (?) field, from Bond mine, ½ mile northeast of Barrelville, on switch of the Cumberland & Pennsylvania R. R. Coal bed, Brookville, known as Bluebaugh; Carboniferous age, Allegheny formation. Roof, shale overlaid by massive sandstone; floor, sand shale; cover at point of sampling, 135 feet. The bed was sampled by the Maryland Geological Survey on November 20, 1916, as described below:

<i>Section of coal bed in Bond mine.</i>		
Roof, shale.		Ft. in.
Coal ^a		8
Shale ^a	1	8½
Coal.....		2¼
Shale ^a		¾
Coal.....	1	10¾
Shale ^a		1¾
Coal.....		5
Shale.....		1½
Coal.....		2½
Floor, shale.		
Thickness of bed.....	5	5½
Thickness of coal sampled.....	2	6

This sample was taken at rib of straight heading, 180 feet northeast of 1 left heading. At time of sampling, the mine was not in operation.

BARRELVILLE. EMRICK No. 1 MINE.

Analysis 26504 (p. 40). Semibituminous coal, Georges Creek field, from Emrick No. 1 mine, ½ mile southwest of Barrelville, on the Cumberland & Pennsylvania R. R. Coal bed, Bluebaugh (Brookville); Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, 203 feet. The bed was sampled at

^a Not included in sample.

face of main heading, 2,100 feet from mine mouth, by the Maryland Geological Survey on June 20, 1916, as described below:

Section of coal bed in Emrick No. 1 mine.

	Ft.	in.
Roof, shale.		
Coal.....	2	7
Shale ^a		2
Coal.....		9
Floor, shale.		
Thickness of bed.....	3	6
Thickness of coal sampled.....	3	4

The mine is small, producing about 300 tons a month at time of sampling.

BARRELVILLE. PARKER MINE.

Analysis 26539 (p. —). Semibituminous coal, Georges Creek field, from Parker mine, $\frac{1}{2}$ mile northeast of Barrelville, on switch of the Cumberland & Pennsylvania R. R. Coal bed locally known as Parker; Carboniferous age, Allegheny formation. Roof, at places shale, "draw slate," and at others sandstone; floor, sand shale; cover at point of sampling, about 80 feet.

Section of coal bed in Parker mine.

	Ft.	in.
Roof, at places, shale.		
"Draw slate" ^a		2½
Coal.....	1	11
Floor, sand shale.		
Thickness of bed.....	2	1½
Thickness of coal sampled.....	1	11

This sample was taken in 2 room on right at top of dip heading. At time of sampling the mine was not worked.

BARRELVILLE. PRATT MINE.

Analysis 26542 (p. 40). Semibituminous coal, Georges Creek field, from Pratt mine, 1 mile southwest of Barrelville. Coal bed, Brush Creek; Carboniferous age, Conemaugh formation. Roof, gray shale; floor, black shale; cover at point of sampling, 80 to 90 feet. The bed was sampled by the Maryland Geological Survey on September 12, 1916, as described below:

Section of coal bed in Pratt mine.

	Ft.	in.
Roof, shale.		
Coal.....	1	8
Bone ^a		5½
Floor, shale.		
Thickness of bed.....	2	1½
Thickness of coal sampled.....	1	8

This sample was taken at face of main heading, 80 feet from entry. At time of sampling the mine was not shipping.

BARTON. MOSCOW NO. 3 MINE.

Analysis 26533 (p. 40). Semibituminous coal, Georges Creek (?) field, from Moscow No. 3 mine, $\frac{3}{4}$ mile north of Barton, on the Cumberland & Pennsylvania R. R. Coal bed, Bakerstown; Carboniferous age, Conemaugh formation. Roof and floor, shale;

^a Not included in sample.

cover at point of sampling, about 250 feet. The bed was sampled by the Maryland Geological Survey on September 23, 1916, as described below:

Section of coal bed in Moscow No. 3 mine.

	Ft.	in.
Roof, shale.		
Bone ^a	5	$\frac{3}{4}$
Coal.....	1	$4\frac{1}{2}$
Bone and shale ^a		$\frac{1}{4}$
Coal.....	8	$\frac{1}{4}$
Floor, shale.		
Thickness of bed.....	2	$6\frac{3}{4}$
Thickness of coal sampled.....	2	$\frac{3}{4}$

This sample was taken at face of 4 room, 2 left heading. During 1915 the mine was not steadily in operation; during 1916 the output varied from 100 to 150 tons per day.

BARTON. SWANTON MINE.

Analyses 26978 and 26986 (p. 40). Semibituminous coal, Georges Creek (?) field, from Swanton mine, at Barton, on the Cumberland & Pennsylvania R. R. Coal bed, Bakerstown; Carboniferous age, Conemaugh formation. Roof and floor, shale; cover at point of sampling, 800 feet. The bed was sampled by the Maryland Geological Survey on November 21, 1916, as described below:

Section of coal bed in Swanton mine.

	Ft.	in.
Roof, shale.		
Bone ^a	1	6
Coal.....	2	4
Floor, shale.		
Thickness of bed.....	3	10
Thickness of coal sampled.....	2	4

Section A (sample 26978) was taken at right rib, face of 6 right heading, 1,700 feet from entry. The daily output at time of sampling was 100 to 125 tons.

The bed was also sampled by the Maryland Geological Survey on November 21, 1916, as described below:

Section of coal bed in Swanton mine.

	Ft.	in.
Roof, shale.		
Coal.....		3
Shale ^a		1
Coal.....	1	$10\frac{3}{4}$
Floor, shale.		
Thickness of bed.....	2	$2\frac{1}{4}$
Thickness of coal sampled.....	2	$1\frac{3}{4}$

This sample was taken at face of 2 right butt, main entry, about 150 feet from mine mouth, where the cover was 350 feet. At time of sampling the mine was not in operation.

BORDEN SHAFT. CONSOLIDATION No. 12 MINE.

Analysis 26528 (p. 40). Semibituminous coal, Georges Creek field, from Consolidation No. 12 mine, at Borden Shaft, on main line of the Cumberland & Pennsylvania R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Roof and floor, shale; cover at point of sampling, 200 feet. The bed was sampled by the

^a Not included in sample.

Maryland Geological Survey on September 4, 1916, at "Klondike" heading, off left empty slant, as described below:

Section of coal bed in Consolidation No. 12 mine.

Roof, shale.	Ft. in.
Coal.....	6 6½
Shale ^a	½ ¾
Coal.....	4½
Shale ^a	½
Coal.....	11½
Shale ^a	¼
Coal.....	11½
Floor, shale.	
Thickness of bed.....	8 11
Thickness of coal sampled.....	8 9½

The daily output at time of sampling was about 100 tons.

ECKHART. WASHINGTON NO. 2 MINE.

Analysis 26507 (p. 40). Semibituminous coal, Georges Creek field, from Washington No. 2, a drift mine near Eckhart, on the Eckhart branch of the Cumberland & Pennsylvania R. R. Coal bed, Tyson, or Upper Sewickley; Carboniferous age, Monongahela formation. Roof, hard, sandy shale; floor, shale; cover at point of sampling, 80 feet. The bed was sampled by the Maryland Geological Survey on June 26, 1916, in 6 room, 4 left heading, and showed coal 4 feet 2 inches thick, with no impurities to be discarded in mining.

For analysis of other samples from this mine see Bureau of Mines Bull. 22, p. 109.

ELLERSLIE. ELLERSLIE CLAY MINE.

Analyses 26987 and 26988 (p. —). Bituminous coal from Ellerslie clay mine, 2 miles west of Ellerslie. Coal beds known as Mercer and Quakertown; Carboniferous age, Pottsville formation. Roof and floor of Mercer bed, shale; roof of Quakertown bed, shale; floor, fire clay; cover at point of sampling in Mercer bed over 120 feet, in Quakertown bed over 150 feet. The beds were sampled by the Maryland Geological Survey on November 20, 1916, as described below:

Section of Mercer coal bed in Ellerslie clay mine.

Roof, shale.	Ft. in.
Coal.....	1 2
Fire clay ^a	4 3
Coal.....	1 3½
Shale ^a	5
Coal.....	1 4
Floor, shale.	
Thickness of bed.....	8 5½
Thickness of coal sampled.....	3 9½

Sample 2698 was cut at 1 right butt, 1 right heading, 1,000 feet from entry. At time of sampling the mine was not in operation.

^a Not included in sample.

Section of Quakertown coal bed in Ellerslie clay mine.

	Ft.	in.
Roof, shale.		
Coal.....	1	1½
Shale ^a		3
Coal.....		8
Floor, fire clay.		
Thickness of bed.....	2	½
Thickness of coal sampled.....	1	9½

Sample 26988 was cut at right rib, 2 right heading, 20 feet from main heading, 1,200 feet from entry. At time of sampling the mine was not worked.

FRANKLIN STATION. MILLER & GREENE No. 1 MINE.

Analysis 26544 (p. —). Semibituminous coal, Georges Creek (?) field, from Miller & Greene No. 1 mine, at Franklin Station, on the Cumberland & Pennsylvania R. R. Coal bed, Parker (Clarion); Carboniferous age, Allegheny formation. Roof, sandstone; floor, bastard fire clay; cover at point of sampling, 300 feet. The bed was sampled by the Maryland Geological Survey on August 14, 1916, as described below:

Section of coal bed in No. 1 mine.

	Ft.	in.
Roof, sandstone.		
Coal.....	1	2½
Clay binder ^a		1½-2
Coal.....		5¾
Shale binder ^a		1¼
Coal.....		6
Floor, bastard fire clay.		
Thickness of bed.....	2	5-5½
Thickness of coal sampled.....	2	2¼-2¾

This section was taken in butt off main heading. At time of sampling the daily output was 125 to 150 tons.

FROSTBURG. CONSOLIDATION No. 9 MINE.

Analysis 26510 (p. 41). Semibituminous coal, Georges Creek field, from Consolidation No. 9, a drift mine, 1½ miles northeast of Frostburg, on the Cumberland & Pennsylvania R. R. Coal bed, Tyson (Upper Sewickley); Carboniferous age, Monongahela formation. Roof and floor, shale; cover at point of sampling, about 100 feet. The bed was sampled by the Maryland Geological Survey on September 26, 1916, in man-way of 1 room, 2 right, where the entire seam was composed of 3 feet 7 inches of coal, no portions being discarded in mining. The average daily output at time of sampling was 625 tons.

FROSTBURG. CONSOLIDATION No. 14 MINE.

Analyses 68177, 68215, and 30164; also five tipple samples—30092, 68176, 68198, 68199, and 30165 (p. 41). Semibituminous coal, Frostburg district, from Consolidation No. 14 mine, a drift mine 1¼ miles north of Frostburg, Md., on the Cumberland & Pennsylvania R. R. Coal bed, Pittsburgh, known in this field as the "Big Vein;" Carboniferous age, Monongahela formation. Average thickness of bed, 14 feet; bed lies flat; faint cleat; no faults, rolls, or horsebacks; roof, black shale; floor, hard shale. Roof and floor shale showed no tendency to become mixed with the coal in ship-

^a Not included in sample.

ments. The bed was sampled by E. Stebinger on December 30, 1917, as described below:

Section of coal bed in Consolidation No. 14 mine.

Section.....	A.	B.
Laboratory No.....	68177	68215
Roof, black shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal, clean, lustrous.....	1 9	1 5½
Shale, black.....	a 7	a 9
Coal, soft.....	2 1	1 3
Coal, soft.....	1	
Coal, soft.....	10	
Shale, black.....	1½	
"Sulphur" streak.....		½
Coal.....	5½	9½
Coal, soft.....		1½
Coal.....		10
Shale, black.....	a 1	a 1½
Coal, soft, lustrous.....	8	
Coal.....		16½
Shale.....	½	a 1
Coal.....	1 4	1 0
Floor, hard shale.		
Thickness of bed.....	8 ¼	6 11¼
Thickness of coal sampled.....	7 ¼	6 ¼

a Not included in sample.

Section A (sample 68177) was cut 125 feet from mouth of Clifton opening in air course. Section B (sample 68215) was cut in oil-house heading, opposite room 25.

The ultimate analysis of a composite sample made by combining face samples 68177 and 68215 is given under laboratory No. 30164. The ultimate analysis of a composite sample made by combining tipple samples 68176, 68198, and 68199 is given under laboratory No. 30165.

Tipple samples 68176, 68198, and 68199 represented run of mine coal being loaded; sample 30164 was a composite of these samples. Tipple sample 30092 represented run of mine coal.

In 1917 the mine had capacity of 50 tons a day, and the actual average at time of sampling was 50 tons a day. It had a wooden tipple, used no coal-cutting machines, and had mule haulage. The coal was undercut by hand and shot down by black powder. The probable lifetime of the mine was 10 years. All tonnage from the mine was to be derived from pillar workings. It was expected the tonnage would soon be increased to 250 tons a day. The coal was all shipped as run of mine and was picked on car by one picker. Track capacity, 10 cars.

GANNONS STATION. WASHINGTON No. 1 MINE.

Analysis 26979 (p. 41). Semibituminous coal, Georges Creek (?) field, from Washington No. 1 mine, near Gannons station, on the Cumberland & Pennsylvania R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, about 300 feet. The bed was sampled by the Maryland Geological Survey on November 22, 1916, as described below:

Section of coal bed in Washington No. 1 mine.

Roof, shale.	<i>Ft. in.</i>
Coal.....	2 8
Shale, hard ^a	10½
Coal.....	3½
Bone ^a	½-1
Coal.....	1 5
Floor, shale.	
Thickness of bed.....	5 3½-4
Thickness of coal sampled.....	4 4½-5

This sample was cut at 4 right air course, 2,200 feet west of entry. The daily output at time of sampling was 150 tons.

^a Not included in sample.

HOFFMAN. CONSOLIDATION No. 3 MINE.

Analysis 26526 (p. 41). Semibituminous coal, Georges Creek field, from Consolidation No. 3 mine, at Hoffman, on the Cumberland Pacific R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Roof and floor, shale; cover at point of sampling, about 200 feet. The bed was sampled by the Maryland Geological Survey on August 1, 1916, as described below:

Section of coal bed in Consolidation No. 3 mine.

Roof, shale.	Ft.	in
Coal.....	5	9
Shale ^a		1½
Coal.....		7
Shale ^a		1
Coal.....	1	1½
Shale ^a		½
Coal.....	1	4
Floor, shale.		
Thickness of bed.....	9	½
Thickness of coal sampled.....	8	9½

This section was cut at north side, main heading. The daily output at time of sampling was 1,150 to 1,200 tons.

LITTLE ALLEGANY. UNION No. 1 MINE.

Analysis 26529 (p. 41). Bituminous coal, Georges Creek field, from Union No. 1 mine, ½ mile north of Little Allegany, on a branch of the Cumberland & Pennsylvania R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Roof and floor, shale; cover at point of sampling, 185 feet. The bed was sampled by the Maryland Geological Survey on September 22, 1916, at face of 5 room, 4 left heading, as described below:

Section of coal bed in Union No. 1 mine.

Roof, shale.	Ft.	in
Coal.....		9½
Bone ^a		1½
Coal.....		9½
Bone ^a		1½
Coal.....		7
Bone ^a		1½
Coal.....	2	4
Floor, shale.		
Thickness of bed.....	4	10½
Thickness of coal sampled.....	4	6

The daily output at the time of sampling was 550 tons.

LONACONING. GEORGES CREEK No. 3 MINE.

Analysis 26509 (p. 41). Semibituminous coal, Georges Creek field, from No. 3 mine, at Lonaconing, on Western Maryland R. R. Coal bed, Tyson; Carboniferous age, Monongahela formation. Roof and floor, shale; cover at point of sampling, about 340 to 350 feet. The bed was sampled by the Maryland Geological Survey on September 23, 1916, in Broadback's room off 3 right, at which point the coal was 3 feet 6½ inches thick, with no impurities. The daily output of the mine at time of sampling was 400 tons.

^a Not included in sample.

LONACONING. KINGSLEY MINE.

Analysis 26984 (p. 41). Semibituminous coal, Georges Creek(?) field, from Kingsley mine, near Lonaconing, on west side of Koontz Run, on the Western Maryland R. R. Coal bed, Waynesburg; Carboniferous age, Monongahela formation. The bed was sampled by the Maryland Geological Survey on November 28, 1916, as described below:

Section of coal bed in Kingsley mine.

		Ft.	in.
Roof, not noted.			
Shale ^a		2	
Coal.....	2	1½	
Shale ^a		3	
Coal ^a		2	
Shale ^a		9	
Coal.....	1	1½	
Bone.....		1	
Coal.....		2	
Bone ^a		¾	
Coal ^a		1½	
Shale ^a		1	
Coal ^a		1	
Bone ^a		1¼	
Coal.....		6	
Shale.....		½	
Coal.....		5	
Shale ^a		1½	
Coal.....	2	7	
Floor, not noted.			
Thickness of bed.....	8	11½	
Thickness of coal sampled.....	7	½	

Sample 26894 was cut at right rib of main heading at face 600 feet from entry. The daily output at time of sampling was 50 to 70 tons.

LONACONING. TEST OPENING.

Analysis 26540 (p. 41). Semibituminous coal, Georges Creek field, from test opening ¾ mile northeast of Lonaconing. Coal bed known as Franklin; Carboniferous age, Conemaugh formation. Roof and floor, shale; cover at point of sampling, about 150 feet. The bed was sampled by the Maryland Geological Survey on September 28, 1916, as described below:

Section of Franklin coal bed in test opening near Lonaconing.

		Ft.	in.
Roof, shale.			
Shale, coal, and bone in streaks ^a	1	2	
Coal, dirty.....	1	5	
Shale ^a		6	
Coal.....		4½	
Shale ^a		6	
Coal.....	1	5½	
Floor, shale.			
Thickness of bed.....	5	5	
Thickness of coal sampled.....	3	3	

This sample was taken at about 100 feet south 55° east from opening. At time of sampling the mine was not worked.

^a Not included in sample.

LORD. CONSOLIDATION No. 7 MINE.

Analysis 26530 (p. 41). Semibituminous coal, Georges Creek field, from Consolidation No. 7 mine, $\frac{1}{2}$ mile west of Lord village, on a branch of the Cumberland & Pennsylvania R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Roof and floor, shale; cover at point of sampling, about 350 feet. The bed was sampled by the Maryland Geological Survey on September 27, 1916, in upper section of the Midway, as described below:

Section of coal bed in Consolidation No. 7 mine.

	Ft.	in.
Roof, shale.		
Coal.....	6	3
Shale ^a		$\frac{1}{4}$
Coal.....		3
Shale ^a		$\frac{1}{4}$
Coal.....	1	$\frac{1}{2}$
Shale ^a		$\frac{1}{2}$
Coal.....		11
Floor, shale.		
Thickness of bed.....	8	$7\frac{1}{2}$
Thickness of coal sampled.....	8	$5\frac{1}{2}$

The daily output at the time of sampling was 900 tons.

LUKE. DEVON MINE.

Analysis 26511 (p. 41). Semibituminous coal, Georges Creek field, from Devon, $\frac{1}{4}$ mile north of Luke, on the West Virginia Pulp & Paper Co's R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, 300 feet. The bed was sampled by the Maryland Geological Survey on August 15, 1916, at face of main heading, 3,000 feet from mouth, as described below:

Section of coal bed in Devon mine.

	Ft.	in.
Roof, shale.		
Coal.....		11
Bone ^a		5
Coal.....	1	7
Shale ^a		$\frac{1}{2}$ -1
Coal.....	2	0
Floor, shale.		
Thickness of bed.....	5	0
Thickness of coal sampled.....	4	6

The average daily output at time of sampling was 250 tons.

MIDLAND. CONSOLIDATION No. 8 MINE.

Analyses 68195, 68192, and 30162; also tipple samples 68203, 68209, 68211, 68213, and 30163, each representing a half-day's run over tipple, run-of-mine coal (p. 42). Semibituminous coal, Georges Creek field, from Consolidation No. 8 mine, a drift mine in Ocean Township, $\frac{1}{8}$ mile southwest of Midland, on the Cumberland & Pennsylvania R. R. Coal bed, Pittsburgh, known in this field as "Big Vein;" Carboniferous age, Monongahela formation. Average thickness of bed is 14 feet; bed lies flat, with long rolls; no strong cleat; no faults; a few rolls or horsebacks. The bed was sampled by E. Stebinger on December 30, 1917. Tipple samples were also taken by E. Stebinger, each representing a half-day's run over tipple.

^a Not included in sample.

Sections of bed in Consolidation No. 8 mine.

Section.....	A.	B.
Laboratory No.....	68195	68192
Roof, coal.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, dull with bright layers.....	6	9
Coal, hard, bright.....		11
Coal, bright, soft.....		1 1
Coal, hard, with dull streaks.....		11
Coal, soft.....	4 10	2 11
Shale.....		a 2
Coal.....		6
Black shale.....		1
Coal.....		2 0
Floor, sandy shale.		
Thickness of bed.....	5 4	9 4
Thickness of coal bed sampled.....	5 4	9 1

^a Not included in sample.

Section A (sample 68195) was cut at face of 59 room, Keating heading. Section B (sample 68192) was cut in 8 room, 3 right.

The ultimate analysis of a composite sample made by combining face samples 68192 and 68195 is given under laboratory No. 30162. The ultimate analysis of a composite sample made by combining tipple samples 68203, 68209, 68211, and 68213 is given under laboratory No. 30163.

The capacity of the mine is 275 tons a day; average shipments at time of sampling, 275 tons. Men employed numbered 95 underground and 5 aboveground. The tipple was of wood. Haulage was by electric cable and mules. No coal-cutting machines were used; the coal was undercut by hand and shot down by black powder. The output was all shipped as run of mine and was picked on cars by one picker. There was track capacity for 20 loaded and 20 empty cars. About 50 acres were still unmined. The probable lifetime of the mine was about 10 years.

MONTELL. MONTELL TUNNEL (MERTON'S) MINE.

Analyses 26977 and 26505 (p. —). Semibituminous coal, Georges Creek (?) field, from Montell Tunnel (Merton's) mine, at Montell, on the Western Maryland R. R. Coal beds, Lower Kittanning and Bluebaugh; Carboniferous age, Allegheny formation. Roof, shale; floor in Lower Kittanning bed, shale; in Bluebaugh bed, rock and "wild coal;" cover at point of sampling, 300 feet in Lower Kittanning bed and 360 feet in Bluebaugh bed. The beds were sampled by the Maryland Geological Survey on August 3 and November 20, 1916, as described below:

Section of Lower Kittanning coal bed in Montell Tunnel (Merton's) mine.

Roof, shale.	<i>Ft. in.</i>
Coal.....	10½
Shale ^a	4
Coal.....	1 1½
Shale ^a	11
Coal.....	1 7½
Shale ^a	1
Coal.....	2 1
Floor, shale.	
Thickness of bed.....	7 ½
Thickness of coal sampled.....	5 8½

Sample 26977 was cut at Frederick heading, Lower Kittanning, 4,600 feet southeast from mouth of tunnel. The daily output at time of sampling was 80 to 100 tons.

Sample 26505 was cut at face of 1 left in Bluebaugh bed.

^a Not included in sample.

Section of Bluebaugh coal bed in Montell Tunnel mine.

	Ft. in.
Roof, shale.	
Coal.....	11
Shale.....	a 1 8
Coal.....	1 8
Shale.....	a 1 1½
Coal.....	8½
"Wild coal".....	a 1 6
Floor, rock.	
Total thickness of bed.....	6 7
Thickness of coal sampled.....	3 3½

MORRISON. GIN SANG MINE.

Analysis 26532 (p. —). Semibituminous coal, Georges Creek (?) field, from Gin Sang mine at Morrison, on the Cumberland & Pacific R. R. Coal bed, Bakerstown; Carboniferous age, Conemaugh formation. Roof, bastard fire clay; floor, shale; cover at point of sampling, 150 to 200 feet. The bed was sampled at one point by the Maryland Geological Survey on August 14, 1916, as described below:

Section of coal bed in Gin Sang mine.

	Ft. in.
Roof, bastard fire clay.	
Bone ^a	1 7
Coal.....	8½
Bone ^a	2½
Coal.....	2 0
Floor, shale.	
Total thickness of bed.....	4 6
Thickness of coal sampled.....	2 8½

This sample was cut at main heading right. The output per day at time of sampling was 64 tons.

MOUNT SAVAGE. BALD KNOB MINE.

Analyses 71053 to 71056 (p. 42), and analyses 71130 to 71133 (p. 43), and 71134 to 71137 (p. 43), car samples. Semibituminous coal from the Bald Knob mine, a drift mine 1½ miles north of Mount Savage, on the Cumberland & Pennsylvania R. R. The main operation is in the Pittsburgh or Big Vein; Carboniferous age, Monongahela formation. Bed is 5 to 6 feet thick; roof and floor, shale, which parts readily from the coal. A new opening is being driven into a 3-foot vein 17 feet above the Big Vein; this is believed to be the Tyson. Main roof, shale; immediate roof, 18 inches of bone. The mine was sampled at three points in the Big Vein and one point in the 3-foot vein by N. H. Snyder and H. A. Goodman on June 12, 1919, as described below:

Sections of coal bed in Big Vein.

Section.....	A. 71053	B. 71054	C. 71055
Laboratory No.....			
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 2½	10	10½
Shale.....	a 1½	¾	¾
Coal.....	5½	1 5	4½
Shale.....	a 1¼	a 1½	a ½
Coal.....	2 2½	10¾	11¼
Shale.....		a 1	a ¼
Coal.....		2 4½	5¾
Shale.....			a 1½
Coal.....			1 2½
"Sulphur".....			1 1
Coal.....			11½
Floor, shale.			
Thickness of bed.....	5 1	5 9½	5 1
Thickness of coal sampled.....	5 1	5 9½	5 1

^a Not included in sample.

Section of coal bed in 3-foot vein.

Section.....	D.
Laboratory No.....	71056
	<i>Ft. in.</i>
Roof, shale and bone.....	1 6
Coal.....	1 8
Shale.....	a 1
Coal.....	2
Soft shale.....	a 2
Coal.....	1 1
Floor, shale.....	
Thickness of bed.....	4 8
Thickness of coal sampled.....	3 2

^a Not included in sample.

Section A (sample 71053) was cut at face of 7 room on main heading, 1,300 feet from opening, Big Vein. Section B (sample 71054) was cut from face of 2 right heading, 900 feet from opening, Big Vein. Section C (sample 71055) was cut at face of 5 room, 2 left heading, 1,400 feet from opening, Big Vein. Section D (sample 71056) was cut from face of main heading, 700 feet from opening, 3-foot vein.

The mine is opened by a drift. System of mining, room and pillar. In 1919 coal was undercut by hand and shot down with black powder. The daily capacity of the mine was 250 tons. Men employed numbered 44 underground and 10 on the surface. Haulage was by mules. Coal was run down slope ($\frac{1}{8}$ mile) to the tippie by cable operated by electricity. The coal was shipped as run of mine and was picked on cars by two pickers. A new opening 17 feet above the main opening was being driven into a 3-foot vein, believed to be the Tyson vein. Heading had been driven in about 700 feet.

Car samples 71130 to 71133 and 71134 to 71137 (p. 43) were taken from two cars loaded and shipped from the mine June 16, 1919, under the supervision of N. H. Snyder. The cars were sampled at the Government Fuel Yard, Washington, D. C., June 25, 1919, by R. J. Swingle. A 1,000-pound sample was collected from each car by taking successive large shovelfuls of coal at intervals under the cars as they were being dumped. Samples were crushed and quartered by mechanical crusher at the Bureau of Mines laboratory, Washington, D. C.

MOUNT SAVAGE. NO. 6 FIRE CLAY MINE.

Analysis 26580 (p. 43). Semibituminous coal, Georges Creek (?) field, from No. 6 fire clay mine, 2½ miles northwest of Mount Savage. Coal bed, Mount Savage (Mercer); Carboniferous age, Pottsville formation. Roof and floor, shale; cover at point of sampling, about 300 feet. The bed was sampled by the Maryland Geological Survey on November 6, 1916, at butt opening, main heading, about 600 feet from entry, as described below:

Section of coal bed in No. 6 fire-clay mine.

Roof, shale.....	<i>Ft. in.</i>
Coal.....	3½
Struggle (?) ^a	¼
Coal.....	5
Shale ^a	1
Coal.....	3½
Stone ^a	¼
Coal.....	2½
Shale ^a	½
Coal.....	1½

^a Not included in sample.

Roof, shale—Continued.	Ft. in.
Shale <i>a</i>	$\frac{1}{8}$
Coal.....	3
Shale <i>a</i>	$\frac{1}{8}$
Coal.....	1
Bone <i>a</i>	2
Coal.....	1

Floor, shale.

Thickness of bed.....	2 1 $\frac{1}{4}$
Thickness of coal sampled.....	1 9 $\frac{1}{2}$

The daily output of the mine at time of sampling was three tons.

MOUNT SAVAGE. HENRY MULLANEY'S MINE.

Analysis 26543 (p. 43). Semibituminous coal, Georges Creek (?) field, from Henry Mullaney's mine, $\frac{3}{4}$ mile east of Mount Savage, about 50 feet south of the Cumberland & Pennsylvania R. R. Coal bed, Lower Freeport; Carboniferous age, Allegheny formation. Roof, bastard fire clay; floor, black shale; cover at point of sampling, 60 to 80 feet. The bed was sampled by the Maryland Geological Survey on September 12, 1916, at face of main heading, 120 feet from mouth, as described below:

Section of coal bed in Henry Mullaney's mine.

Roof, bastard fire clay.	Feet.
Bone <i>a</i>	.45
Parting <i>a</i>	.005
Coal.....	1.26
Parting <i>a</i>	.007
Bone <i>a</i>	.15
Parting <i>a</i>	.005
Coal, bony.....	1.03
Binder <i>a</i>	.02
Coal.....	.34
Bone <i>a</i>	.35
Bone and shale <i>a</i>	.91

Floor, black shale.

Thickness of bed.....	4.527
Thickness of coal sampled.....	2.630

At time of sampling no shipping was done.

OCEAN. CONSOLIDATION No. 1 MINE.

Analysis 26527 (p. 43). Semibituminous coal, Georges Creek field, from Consolidation No. 1 mine, near Ocean station, on the Cumberland & Pennsylvania R. R. Coal bed, Pittsburgh ("Big Vein"); Carboniferous age, Monongahela formation. Cover at point of sampling, 160 feet. The bed was sampled by the Maryland Geological Survey on August 1, 1916, at face of Spitzman's heading, as described below:

Section of coal bed in Consolidation No. 1 mine.

Roof, shale.	Ft. in.
Coal.....	5 11
Shale <i>a</i>	$\frac{1}{4}$
Coal.....	6
Shale <i>a</i>	1

a Not included in sample.

Roof, shale—Continued.	Ft.	in.
Coal.....	1	0
Shale ^a		4
Coal.....	1	7
Floor, shale.		
Thickness of bed.....	9	2
Thickness of coal sampled.....	9	0

The daily output at time of sampling was 1,650 tons.

OCEAN. CONSOLIDATION No. 1 MINE.

Analyses 68217, 68218, 68226, 68178, 68181, and 30179; also tipple samples 68182, 68197, 68216, 68221, and 30180 (p. 43), taken from 237 2-ton cars at the tipple. Bed is 5 to 9 feet thick; roof $1\frac{1}{2}$ to 2 feet of "top coal," above which is shale, about 8 inches thick, and $2\frac{1}{2}$ to 4 feet of shale and coal "rash," above which lies sandstone; floor, shale and bottom coal, with smooth surface. The bed was sampled by E. T. Hancock on December 30, 1917; tipple samples also were taken by E. T. Hancock.

Sections of coal bed in Consolidation No. 1 mine.

Sections.....	A.	B.	C.	D.	E.
Laboratory No.....	68181	68218	68226	68178	68217
Roof, top coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	5 10	5 10	5 7	6 9	5 8
Shale.....	^a 1	^a 1	^a $1\frac{1}{2}$	^a 1	^a $1\frac{1}{2}$
Coal with streaks of shale.....	6	^a 6	$3\frac{1}{2}$	6	$3\frac{1}{2}$
Shale.....	^a $1\frac{1}{4}$	^a 1	^a $1\frac{1}{2}$	^a $1\frac{1}{2}$	^a $1\frac{1}{2}$
Coal with streaks of shale.....	2 2	^a 1 10	1 10	2 $1\frac{3}{4}$	1 8
Floor, shale, and coal.					
Thickness of bed.....	8 $8\frac{1}{4}$	8 4	7 11	9 $7\frac{1}{4}$	7 $10\frac{1}{4}$
Thickness of coal sampled.....	8 6	5 10	7 $8\frac{1}{2}$	9 $4\frac{1}{2}$	7 $7\frac{1}{2}$

^a Not included in sample.

Section A (sample 68181) was cut in 5 room, Old Lye heading inside 20 heading. Section B (sample 68218) was cut in 4 room, 9 heading off Hawkins heading. Section C (sample 68226) was cut in Spitzmans heading 210 feet outside of 2 right. Section D (sample 68178) was cut at face of rock heading at 2 right. Section E (sample 68217) was cut at face of 7 room, 9 right off straight slope.

The ultimate analysis of a composite sample made by combining face samples 68178, 68181, 68217, 68218, and 68226 is given under laboratory No. 30179. The ultimate analysis of a composite sample made by combining tipple samples 68182, 68197, 68216, and 68221 is given under laboratory No. 30180.

In 1917 the capacity of the mine was from 900 to 1,000 tons a day, and the average daily shipments were 950 tons. There was a wooden tipple at mine. Haulage was by mule and by compressed air. The coal did not seem to stick to roof, and the roof did not fall to any great extent, nor did it become mixed with the coal to excess in shipments. The coal was cut mostly by hand. The coal was all shipped run of mine and was picked by one picker in mine, one on dump, and one in car. No coal was coked. The two loading tracks had capacity for 30 empty and 20 loaded railroad cars.

SHORT GAP. STANTON-GEORGES CREEK No. 1 MINE.

Analysis 26521 (p. 43). Semibituminous coal, Georges Creek field, from Stanton-Georges Creek No. 1 mine, at Short Gap, $1\frac{1}{4}$ miles east of Clarysville, on a branch of the Cumberland & Pennsylvania R. R. Coal bed, Upper Freeport; Carboniferous

^a Not included in sample.

age, Allegheny formation. Roof, sandstone; floor, shale; cover at point of sampling, 225 feet. The bed was sampled by the Maryland Geological Survey on August 3, 1916, at face of 3 room, 4 right, as described below:

Section of coal bed in Stanton-Georges Creek No. 1 mine.

	Ft.	in.
Roof, sandstone.		
Coal	7	
Shale ^a	2	
Coal	2	1½
Shale ^a	4	¾
Coal	1	9
Floor, shale.		
Thickness of bed	5	¼
Thickness of coal sampled	4	5½

The daily output of the mine at time of sampling was 75 tons.

WESTERNPORT. TACOMA MINE.

Analysis 26520 (p. 43). Semibituminous coal, Georges Creek field, from Tacoma mine, ¼ mile north of Westernport, on the Cumberland & Pennsylvania R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, shale or rock; floor, shale; cover at point of sampling, about 90 feet. The bed was sampled at 8 room, 1 right heading, by the Maryland Geological Survey on September 26, 1916, as described below:

Section of coal bed in Tacoma mine.

	Ft.	in.
Roof, shale or rock.		
Coal	10	
Bone ^a	1	6
Coal	6	
Shale ^a	1	
Coal	2	2½
Floor, shale.		
Thickness of bed	4	1½
Thickness of coal sampled	3	6½

The daily output of the mine at time of sampling was 200 tons.

GARRETT COUNTY.

BARNUM (VA.). MONROE NO. 1 MINE.

Analysis 26983 (p. 43). Semibituminous coal, Upper Potomac basin, from No. 1 mine, near Barnum, Va., on the Western Maryland R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, sandstone; floor, shale; cover at point of sampling, about 500 feet. The bed was sampled at one point by the Maryland Geological Survey on November 24, 1916, as described below:

Section of coal bed in No. 1 mine.

	Ft.	in.
Roof, sandstone.		
Bone ^a	2	
Coal	1	11½
Rock ^a	6	
Coal	1	1

^a Not included in sample.

Roof, sandstone—Continued.	Ft. in.
Binder <i>a</i>	1 1/2
Coal.....	1 0
Bone <i>a</i>	2
Floor, shale.	
Thickness of bed.....	4 11
Thickness of coal sampled.....	4 1/2

This sample was cut at right rib of 6 left heading (50 feet from main heading), 1,500 feet west of entry. The daily output at time of sampling was 100 tons.

BARTON. MONROE No. 2 MINE.

Analysis 26982 (p. 43). Semibituminous coal, Georges Creek field, from No. 2 mine, near Barton, on the Western Maryland R. R. Coal bed, Bakerstown; Carboniferous age, Conemaugh formation. Roof and floor, shale; cover at point of sampling, about 100 feet. The bed was sampled by the Maryland Geological Survey on November 24, 1916, as described below:

Section of coal bed in No. 2 mine.

Roof, shale.	Ft. in.
Bone <i>a</i>	8
"Black jack" <i>a</i>	4
Coal.....	2 4
Floor, shale.	
Thickness of bed.....	3 4
Thickness of coal sampled.....	2 4

This sample was cut at face of 7 right heading, 1,200 feet northwest of entry. The daily output of the mine at time of sampling was 100 tons.

BAYARD STATION. NETHKIN MINE.

Analysis 26524 (p. 44). Semibituminous coal, Upper Potomac basin, from Nethkin mine, 1/8 mile east of Bayard station, on the Western Maryland R. R. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, 250 feet. The bed was sampled by the Maryland Geological Survey on August 31, 1916, as described below:

Section of coal bed in Nethkin mine.

Roof, shale.	Ft. in.
Bone <i>a</i>	3
Coal.....	10 1/2
Bone <i>a</i>	4 1/2
Coal.....	3
Bone <i>a</i>	3
Coal.....	4 1/2
Bone <i>a</i>	1/2
Coal.....	2 4
Floor, shale.	
Thickness of bed.....	4 9
Thickness of coal sampled.....	3 10

This sample was cut at face of 2 left heading. The weekly output at time of sampling was 50 to 100 tons.

a Not included in sample.

BLAINE. HAMILL NO. 2 MINE.

Analysis 26980 (p. 44). Semibituminous coal, Upper Potomac basin, from Hamill No. 2 mine, $\frac{3}{4}$ mile east of Blaine, on the Western Maryland R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, 400 feet. The bed was sampled by the Maryland Geological Survey on November 24, 1916, as described below:

Section of coal bed in No. 2 mine.

Roof, shale.	Ft.	in.
Coal ^a	7	
Bone.....	1	
Coal.....	6½	
Bone.....	½	
Coal.....	8½	
Bone.....	¼	
Coal.....	6½	
Shale ^a	2½	
Coal.....	2	
Bone.....	¼	
Coal.....	1	7
Shale ^a	1	
Bony coal.....	7	
Floor, shale.		
Thickness of bed.....	5	2
Thickness of coal sampled.....	4	3½

This sample was cut at air course, 2 left heading at boundary line, 1,600 feet northwest of opening. The daily output at time of sampling was 200 tons.

BLAINE. PEERLESS NO. 3 MINE.

Analysis 26981 (p. 44). Semibituminous coal, Upper Potomac basin, from Peerless No. 3 mine, 1 mile east of Blaine, on the Western Maryland R. R. Coal bed, Upper Freeport bed; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, 200 feet. The bed was sampled by the Maryland Geological Survey on November 24, 1916, as described below:

Section of coal bed in Peerless No. 3 mine.

Roof, shale.	Ft.	in.
Coal.....	1	1½
Bone ^a	1½	
Coal.....	3	0
Floor, shale.		
Thickness of bed.....	4	3
Thickness of coal sampled.....	4	1½

This sample was cut at face of 1 room, 5 left heading, 1,000 feet from entry. The daily output at time of sampling was 300 tons.

BLOOMINGTON. BLOOMINGTON NO. 7 MINE.

Analysis 26512 (p. 44). Semibituminous coal, Georges Creek (?) field, from No. 7, 1 mile west of Bloomington, on the Baltimore & Ohio R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of

^a Not included in sample.

sampling, over 500 feet. The bed was sampled by the Maryland Geological Survey on August 23, 1916, as described below:

Section of coal bed in No. 7 mine.

	Ft.	in.
Roof, shale.		
Coal.....		8
Bone ^a		8½
Coal.....	1	10
Bone ^a		2½
Coal.....	1	10½
Floor, shale.		
Thickness of bed.....	5	3½
Thickness of coal sampled.....	4	4½

This sample was cut at face of 6 room, 3 left heading. The average daily output at time of sampling was 100 to 125 tons.

CHAFFEE. CHAFFEE MINE.

Analysis 26514 (p. 44). Semibituminous coal, from Chaffee mine, 2 miles northwest of Chaffee, on a switch on the Western Maryland R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, sandstone; floor, shale; cover at point of sampling, over 350 feet. The bed was sampled by the Maryland Geological Survey on August 30, 1916, as described below:

Section of coal bed in Chaffee mine.

	Ft.	in.
Roof, sandstone.		
Coal.....		8
Shale ^a	1	0
Coal.....		7
Bone, binder ^a		1
Coal.....	1	8
Bone, binder ^a		1
Coal.....	1	4
Floor, shale.		
Thickness of bed.....	5	5
Thickness of coal sampled.....	4	3

This sample was taken at face of main heading, over a mile from mouth of mine. The daily output at time of sampling was 400 tons.

CRELLIN. GUTHRIE MINE.

Analysis 26989 (p. 44). Bituminous coal, Upper Youghiogheny basin, from Guthrie mine, 2 miles southwest of Crellin, about 1 mile southeast of the Preston R. R. Coal bed. Lower Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, 30 feet. The bed was sampled by the Maryland Geological Survey on November 23, 1916, as described below:

Section of coal bed in Guthrie mine.

	Ft.	in.
Roof, shale.		
Coal.....	1	6
Bone ^a		1½
Coal.....		3
Bony coal.....		3½

^a Not included in sample.

Roof, shale—Continued.		Ft.	in.
Coal.....		5	
Bone ^a			3
Coal.....		3	
Bone, shale, "sulphur" ^a	1	3½	
Coal.....		7½	
Bone ^a		2½	
Coal.....	1	1½	
Floor, shale.			
Thickness of bed.....	6	1½	
Thickness of coal sampled.....	4	5½	

This sample was taken at face of 18 left room, main heading, 850 feet northwest of opening. The daily output at time of sampling was 10 to 15 tons.

FRIENDSVILLE. McCULLOH MINE.

Analysis 26519 (p. 44). Bituminous coal, Lower Youghiogheny basin, from McCulloh mine, 1½ miles south of Friendsville. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, 300 feet. The bed was sampled by the Maryland Geological Survey on September 20, 1916, as described below:

<i>Section of coal bed in McCulloh mine.</i>		Ft.	in.
Roof, shale.			
Coal.....		8½	
Bone ^a		2	
Coal.....	3	4	
Floor, shale.			
Thickness of bed.....	4	2½	
Thickness of coal sampled.....	4	½	

This sample was cut at face of new heading, 50 feet above old heading. At time of sampling the daily output was 50 bushels.

GANNONS STATION. WASHINGTON No. 5 MINE.

Analysis 26531 (p. 44). Semibituminous coal, Georges Creek field, from Washington No. 5 mine, opposite Gannons station, on the Cumberland & Pennsylvania R. R. Coal bed, Bakerstown; Carboniferous age, Conemaugh formation. Roof and floor, shale; cover at point of sampling, 100 to 150 feet. The bed was sampled by the Maryland Geological Survey on August 11, 1916, as described below:

<i>Section of coal bed in Washington No. 5 mine.</i>		Ft.	in.
Roof, shale.			
Bone ^a		8	
Shale ^a		½	1
Bone ^a		7	
Bone or "black jack" ^a		4	
Coal.....	2	3	
Floor, shale.			
Thickness of bed.....	3	10½	11
Thickness of coal sampled.....	2	3	

This sample was cut at face of 2 south heading. At time of sampling the daily output was 220 tons.

^a Not included in sample.

GORMAN. STRATHMORE MINE.

Analysis 26523 (p. 44). Semibituminous coal, Upper Potomac basin, from Strathmore, $1\frac{1}{2}$ miles east of Gorman, on the Western Maryland R. R. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, over 450 feet. The bed was sampled by the Maryland Geological Survey on August 26, 1916, as described below:

Section of coal bed in Strathmore mine.

	Ft.	in.
Roof, shale.		
Coal.....	7	
Shale, binder ^a	$1\frac{1}{2}$	2
Coal.....	1	6
Shale, binder ^a	1	$-1\frac{1}{2}$
Coal.....	5	
Bone, binder ^a	$3\frac{1}{2}$	4
Coal.....	1	1
Shale, binder ^a	4	
Coal.....	8	
Floor, shale.		
Thickness of bed.....	5	$1-2\frac{1}{2}$
Thickness of coal sampled.....	4	3

This section was cut in 7 room, 2 right heading. At time of sampling the daily output was 60 tons.

GRANTSVILLE. BEACHEY'S MINE.

Analysis 26541 (p. 44). Bituminous coal, Castleman basin, from Beachey's mine, $1\frac{1}{2}$ miles west of Grantsville and 2 miles west of Jennings Bros. R. R. Coal bed, locally known as Grantsville; Carboniferous age, Conemaugh formation. Roof and floor, shale; cover at point of sampling, 80 feet. The bed was sampled by the Maryland Geological Survey on September 13, 1916, as described below:

Section of coal bed in Beachey's mine.

	Ft.	in.
Roof, shale.		
Coal.....	$10\frac{1}{2}$	
Shale ^a	1	
Coal.....	1	11
Shale ^a	$1\frac{1}{2}$	
Bony coal.....	7	
Floor, shale.		
Thickness of bed.....	3	7
Thickness of coal sampled.....	3	$4\frac{1}{2}$

This sample was cut at 6 room, 2 right heading. The daily output at time of sampling was 300 bushels.

HARRISON. DODSON No. 3 MINE.

Analysis 26513 (p. 45). Semibituminous coal, Upper Potomac basin, from Dodson No. 3 mine, 1 mile east of Harrison, on the Western Maryland R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at

^a Not included in sample.

point of sampling, over 400 feet. The bed was sampled by the Maryland Geological Survey on August 29, 1916, as described below:

Section of coal bed in No. 3 Dodson mine.

Roof, shale.	Ft.	in.
Coal.....	3	
Bone, binder ^a		1½
Coal.....	4½	
Bone, Binder ^a	1	
Coal.....	3	
Shale, binder ^a	1	
Coal.....	1	5½
Shale, binder ^a	1	
Coal.....	1	6
Floor, shale.		
Thickness of bed.....	4	1½
Thickness of coal sampled.....	3	10

This sample was cut in 4 butt, 1 left heading. At time of sampling the daily output was 200 tons.

HARRISON. DODSON No. 5 MINE.

Analysis 26537 (p. 45). Semibituminous coal, Upper Potomac basin, from Dodson No. 5 mine, 1 mile west of Harrison, on the Western Maryland R. R. Coal bed, Upper Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, about 400 feet. The bed was sampled by the Maryland Geological Survey on August 29, 1916, as described below:

Section of coal bed in No. 5 Dodson mine.

Roof, shale.	Ft.	in.
Bone ^a		1
Coal.....	3	6
Bone ^a		1
Floor, shale.		
Thickness of bed.....	3	8
Thickness of coal sampled.....	3	6

This sample was cut at 2 room, 1 right heading. At time of sampling the daily output was 200 tons.

HUBBARD. AJAX HOCKING No. 1 MINE.

Analysis 26515 (p. 45). Semibituminous coal, Upper Potomac basin, from Ajax Hocking No. 1 mine, opposite Hubbard, on the Western Maryland R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, 80 to 100 feet. The bed was sampled by the Maryland Geological Survey on September 1, 1916, as described below:

Section of coal bed in Ajax Hocking No. 1 mine.

Roof, shale.	Ft.	in.
Coal.....	5	
Shale, binder ^a		2
Coal.....	1	¾
Shale, binder ^a		1½
Coal.....	1	1

^a Not included in sample.

Floor, shale.

Thickness of bed.....	2 10½
Thickness of coal sampled.....	2 6½

This sample was taken in 3 room, off 1 right heading. The daily output at time of sampling was 100 to 125 tons.

LONACONING. KOONTZ MINE.

Analysis 26508 (p. 45). Semibituminous coal, Georges Creek field, from Koontz mine, 2 miles northwest of Lonaconing, on a siding of the Western Maryland R. R. Coal bed, Tyson; Carboniferous age, Monongahela formation. Roof and floor, shale; cover at point of sampling, over 150 feet. The bed was sampled by the Maryland Geological Survey on August 10, 1916, at face of main heading, over 1¼ miles from entry, the sample representing 3 feet 5 inches of coal. At time of sampling the daily output was 250 tons.

LONACONING. NEW OPENING.

Analysis 26522 (p. 45). Semibituminous coal, Georges Creek field (?), from a new opening, 3 miles northwest of Lonaconing; no railroad. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, 90 feet. The bed was sampled by the Maryland Geological Survey on August 10, 1916, at face of main heading, 350 feet inside from opening, the sample representing 4 feet 3 inches of coal. At time of sampling the mine was not shipping.

OAKLAND. CHISHOLM MINE.

Analysis 26517 (p. 45). Semibituminous coal, Upper Youghiogheny basin, from Chisholm mine, Strathmore, 4½ miles north of Oakland; no railroad. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, shale; floor, shale and bastard fire clay; cover at point of sampling, 75 feet. The bed was sampled by the Maryland Geological Survey on September 18, 1916, as described below:

Section of coal bed in Chisholm mine.

	<i>Ft. in.</i>
Roof, shale.	
Coal.....	1 4
Bone ^a	2½-3
Coal.....	3
Floor, shale and fire clay.	
Thickness of bed.....	1 9½-10
Thickness of coal sampled.....	1 7

This sample was cut in 1 room, 1 left heading. The daily output at time of sampling was 5 tons.

OAKLAND. JOHN SINES MINE.

Analysis 26538 (p. 45). Bituminous coal, Upper Youghiogheny basin, from John Sines mine, 8 miles north of Oakland. Coal bed, Mercer; Carboniferous age, Pottsville series. Thickness at point of sampling, 1 foot 4½ inches; roof and floor, shale; cover at point of sampling about 50 feet. The bed was sampled by the Maryland Geological Survey on September 19, 1916.

The sample was taken at main heading, 70 feet from mine mouth and represented 1 foot 3 inches of coal. At time of sampling the mine was abandoned.

^a Not included in sample.

OAKLAND. O. R. LEIGHTON MINE.

Analysis 26536 (p. 45). Bituminous coal, Upper Youghiogheny basin, from O. R. Leighton mine, 6 miles northwest of Oakland or $1\frac{1}{4}$ miles southwest of Swallow Falls. Coal bed, "Galitzen"; Carboniferous age, Conemaugh (?) formation. Roof and floor, shale; cover at point of sampling, 40 feet. The bed was sampled by the Maryland Geological Survey on September 19, 1916, as described below:

Section of coal bed in O. R. Leighton mine.

	<i>Ft. in.</i>
Roof, shale.	
Bony coal ^a	2½
Shale ^a	1½
Coal.....	8
Shale ^a	½
Coal.....	1 ½
Bony coal ^a	1
Coal.....	2
Bony coal ^a	1
Coal.....	2
Floor, shale.	
Thickness of bed.....	2 6½
Thickness of coal sampled.....	2

This sample was cut at face of heading in new opening, 60 feet from entry. The daily output at time of sampling was 60 bushels.

OAKLAND. TAYLOR SINES MINE.

Analysis 26525 (p. 45). Bituminous coal, Upper Youghiogheny basin, from Taylor Sines mine, $6\frac{1}{2}$ miles northwest of Oakland or $\frac{3}{4}$ mile southwest of Swallow Falls. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof and floor, shale; cover at point of sampling, about 500 feet. The bed was sampled by the Maryland Geological Survey on September 19, 1916, the sample representing 3 feet $2\frac{1}{2}$ inches of coal. The sample was taken at left rib of main heading, just west of left heading. At the time of sampling the mine was not worked.

OAKLAND. E. Z. TOWER MINE.

Analysis 26534 (p. 45). Bituminous coal, Upper Youghiogheny field, from E. Z. Tower mine, $3\frac{1}{2}$ miles north of Oakland; no railroad. Coal bed, "Galitzen"; Carboniferous age, Conemaugh (?) formation. Roof and floor, shale; cover at point of sampling, 180 feet. The bed was sampled by the Maryland Geological Survey on September 18, 1916, as described below:

Section of coal bed in E. Z. Tower mine.

	<i>Ft. in.</i>
Roof, shale.	
Coal.....	7
Shale.....	½
Coal.....	1 9
Shale.....	1
Coal.....	6
Floor, shale.	
Thickness of bed.....	2 11½
Thickness of coal sampled.....	2 11½

This sample was cut at face of main heading. The daily output at time of sampling was 4 tons.

^a Not included in sample.

SWALLOW FALLS. J. W. BEEGHLY MINE.

Analysis 26535 (p. 45). Bituminous (?) coal, Upper Youghiogheny basin, from J. W. Beeghly mine, 2 miles southwest of Swallow Falls or 7 miles northwest of Oakland; no railroad. Coal bed, "Galitzen"; Carboniferous age, Conemaugh (?) formation. Roof and floor, shale; cover at point of sampling, 55 to 65 feet. The bed was sampled by the Maryland Geological Survey on September 19, 1916, in 2 room, 1 heading, the sample representing 2 feet 5 inches of coal. At time of sampling the daily output was 60 bushels.

SWALLOW FALLS. L. G. SHAEFFER MINE.

Analysis 26518 (p. 45). Bituminous coal, Upper Youghiogheny basin, from L. G. Shaeffer mine, 1 mile east of Swallow Falls or 6 miles north of Oakland. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof and floor, shale, cover at point of sampling, 150 feet. The bed was sampled by the Maryland Geological Survey on September 18, 1916, as described below:

Section of coal bed in L. G. Shaeffer mine.

	Ft.	in.
Roof, shale.		
Bony coal ^a	1	5½
Shale and bastard fire clay ^a		1½
Shale ^a		1½
Coal.....	2	0
Floor, shale.		
Thickness of bed.....	3	8½
Thickness of coal sampled.....	2	0

This sample was taken in 2 room, 3 right heading. The daily output at time of sampling was 4 tons.

MISSISSIPPI.

CHOCTAW COUNTY.

REFORM. MISSISSIPPI O. & G. C. J. S. MINE.

Analyses 25914 and 25915 (p. 45). Lignite, lignite field, from Mississippi O. & G. C. J. S. mine, ½ mile south of Reform, ½ mile west of the New Orleans, Mobile & Chicago R. R. Lignite bed, Tertiary age; Wilcox formation. Roof, carbonaceous clay; floor, fire clay. The bed was sampled on August 18, 1916, by O. B. Hopkins. as described below:

Sections of coal bed in Mississippi O. & G. C. J. S. mine.

Sections.....	A.	B.
Laboratory No.....	25914	25915
Roof, carbonaceous clay.		
Lignite, fairly good.....	^a 1 3	
Lignite, dirty.....	^a 7	
Lignite.....	^a 2	
Carbonaceous clay.....	^a 5½	
Lignite, dirty.....	^a 8	
Lignite, good.....	3 9	^a 1 2½
Lignite, earthy, and clay.....		^a 1 9
Lignite, good.....		2 4
Lignite, covered with water and not sampled.....		^a 1+ 0
Floor, fire clay.		
Thickness of bed.....	6 10½	6 3½+
Thickness of lignite sampled.....	3 9	2 4

^a Not included in sample.

The sections measured and sampled were at face of main entry, 100 feet from mine mouth.

^a Not included in sample.

MONTANA.**BIG HORN COUNTY.****LODGEGRASS. LOCAL PROSPECT.**

Analysis 26149 (p. 46). Subbituminous coal from local prospect in sec. 33, T. 7 S., R. 37 E., about 13 miles southeast Lodgegrass, on Chicago, Burlington & Quincy R. R. Coal bed, Carney; Tertiary age, Fort Union formation. Roof, sandstone; floor, shale. The bed was sampled on August 31, 1916, by R. W. Howell, about 50 feet northwest of opening of prospect. The sample represented 8 feet 1 inch of coal, the thickness of the bed except for 6 inches of carbonaceous shale between the coal and the sandstone roof.

. LOCAL PROSPECT.

Analysis 29370 (p. 46). Subbituminous coal, in sec. 33, T. 7 S., R. 37 E. Coal bed, Carney; Tertiary age; Fort Union (?) formation. The bed was sampled on October 4, 1917, by A. J. Collier. The sample was gathered at face of main entry, 25 feet from mouth of prospect, and represented 8 feet of coal.

BROADWATER COUNTY.**LOMBARD. WESTERN MINE.**

Analyses 28556 and 28557 (p. 46). Coking coal, Lombard field, from Western mine, a slope mine 1 mile west of Lombard, on the Northern Pacific R. R. Coal bed, not named; Cretaceous age, Cascade (?) formation. Thickness of bed varies from 1 to 30 feet, at points of sampling, 6 feet; roof, main, 14 feet of soft friable coal; cover at points of sampling, about 400 feet. The bed was sampled by J. J. Forbes on May 25, 1917. The samples each represented 6 feet of coal, the entire thickness of the coal sampled. Section A (sample 28556) was cut in 1 stub room, north entry. Section B (sample 28557) was cut in 1 stub room, north entry. Coal at this property is found in pockets. The property was abandoned in 1911; prior to that the work done was chiefly prospecting.

CARBON COUNTY.**RED LODGE. RED LODGE NO. 4 MINE.**

Analyses 29466 to 29470 (p. 46). Subbituminous coal, Bear Creek (?) field, from Red Lodge No. 4 mine, a slope mine at Red Lodge, in sec. 27, T. 7 S., R. 20 E., on the Northern Pacific R. R. Coal bed, No. 4; Tertiary age, Fort Union formation. Bed is 8 feet 6 inches to 11 feet 6 inches thick and dips 6° to 22°; cover at point of sampling, 800 feet; elevation of mouth of mine above sea level, 5,545 feet; roof, shale, limestone, and sandstone; floor, clay or sandstone. The bed was sampled by C. A. Allen on November 26, 1917, as described below:

Sections of coal bed in Red Lodge No. 4 mine.

Section..... Laboratory No.....	A. 29469	B. 29466	C. 29468	D. 29467
Roof, A, shale and sandstone; B, shale; C, clay and limestone; D, limestone and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	1			
Coal.....	2 4	3 2	1 9½	
Shale.....	½	a 2 ½	½	a 2
Coal.....	10	2 7	5	2 2½
Shale.....	a 3½	½		
Clay.....			1	1½
Coal.....	1 2½	5	2 6	6 2
Bone.....	1			
Clay.....			1	
Coal.....	1 10		3 10	
Dirt.....	1			
Coal.....	1 1			
Shale.....	¾	¾		
Coal.....	1 2	3 6		
Dirt.....	¾			
Coal.....	4½			
Dirt.....	½			
Coal.....	6			
Shale.....	½			
Coal.....	1 1½			
Floor, A, clay; B, clay; C, fire clay; D, sandstone.				
Thickness of bed.....	11 3	9 11	8 9	8 8
Thickness of coal sampled.....	10 11½	9 9	8 9	8 6

a Not included in sample.

Section A (sample 29469) was cut from 1 room, 8 east entry. Section B (sample 29466) was cut from 46 room, 10 east entry. Section C (sample 29468) was cut from 129 room, 9 east entry. Section D (sample 29467) was cut from 45 room, 12 east entry.

The result of an ultimate analysis of a composite sample made by mixing samples 29466, 29467, 29468, and 29469 is given under laboratory No. 29470.

System of mining, room and pillar. The coal is mined by bearing in at top and then shooting up bottom coal. In 1917 black blasting powder was used and the coal was shot by the miners just before leaving the mine. Haulage on the slopes was by direct-connected steam engine, with a single rope; electric motors were employed for distributing empties and gathering loaded cars. The mine had track capacity for 200 empty and 120 loaded cars. The daily average was 2,300 tons, 70 per cent of which was lump coal and the rest screenings. The unmined area consisted of 1,000 acres. The probable lifetime of the mine was 15 years.

WASHOE. WASHOE MINE.

Analyses 28622 to 28626 (p. 46). Subbituminous coal, Red Lodge or Bear Creek field, from Washoe mine, a slope mine at Washoe, on the Montana, Wyoming & Southern R. R. Coal bed, Bear Creek No. 3; Tertiary age; Fort Union formation. Average thickness of bed is 9½ feet; dip, 4 to 7 per cent south; roof, shale; floor, clay; cover at point of sampling, 500 feet. The bed was sampled by C. A. Allen on June 1, 1917, as described below:

Sections of coal bed in Washoe mine.

Section..... Laboratory No.....	A. 28625	B. 28624	C. 28623	D. 28622
Roof, clay.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 1	6 2	5 11	5 7
Clay.....	½	a 6	a 3	a 4
Coal.....	2 2½	1 8	3 4	2 7
Clay.....	a 4			
Coal.....	9			
Coal dirty.....		6		
Clay.....	½			
Coal.....	2 ½	1 6		
Coal, in floor.....	a 1 0			
Floor, clay.				
Total, thickness.....	9 6	10 4	9 6	8 6
Thickness of coal sampled.....	8 2	9 8	9 3	8 2

a Not included in sample.

Section A (sample 28625) was taken from left side neck of 13 room, 15 feet in from 2 east entry. Section B (sample 28624) was taken 20 feet back from face in 1 east back entry. Section C (sample 28623) was taken from upper end of parting in main north, near 4 east entry. Section D (sample 28622) was taken from left rib 9 room, 50 feet in room from 3 east entry.

The ultimate analysis of a composite sample made by combining samples 28622, 28623, 28624, and 28625 is given under laboratory No. 28626.

System of mining, room and pillar. In 1917 the coal was undercut by machine and shot down by black powder. A large part of the mining was done by hand. The average output was 785 tons a day. Practically all the coal was shipped as run of mine to the smelter of the Anaconda Copper Mining Co.

GALLATIN COUNTY.

PROSPECT.

Analysis 26729 (p. 47). Bituminous coal from prospect in sec. 3, T. 9 S., R. 3 E. Geologic relations unknown. Sampled on October 31, 1916, by D. D. Condit. Coal at point of sampling was 4 feet thick. Sample, which was cut at face of drift, 30 feet from mouth of prospect, was weathered.

MUSSELSHELL COUNTY.

ROUNDUP. ROUNDUP A MINE.

Analyses 28999 to 29004 (p. 47). Subbituminous coal, Bull Mountain field, from Roundup A mine, a slope mine 1 mile west of Roundup, in sec. 23, T. 8 N., R. 25 E., on the Chicago, Milwaukee & St. Paul R. R. Coal bed, Roundup; Tertiary age, Fort Union formation. Average thickness of bed, 6 feet; flat, except near outcrop; dips, 0° to 20°; roof, good; clayey sandstone; floor, clay; cover at points of sampling, 45 to 175 feet. The bed was sampled by C. A. Allen on August 10, 1917, as described below:

Sections of coal bed in Roundup A mine.

Section.....	A. 28999	B. 29003	C. 29001	D. 29000	E. 29002
Laboratory No.....					
Roof, clayey sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone, coal, and shale.....	<i>a</i> 4	<i>a</i> 6			
Shale.....			<i>a</i> 6	<i>a</i> 4½	<i>a</i> 3½
Coal.....	5 11	5 9	5 8	5 9	5 2
Coal.....	<i>a</i> 4		<i>a</i> 2	(<i>a</i>)	<i>a</i> 8
Floor, clay.					
Thickness of bed.....	6 7	6 3	6 4	6 1½	6 1½
Thickness of coal sampled.....	5 11	5 9	5 8	6 1½	5 2

a Not included in sample.

Section A (sample 28999) was taken from right rib, 20 feet from face in 40 room, 2 back entry off of 2 west. Section B (sample 29003) was taken from main, 1 west, 600 feet from slope. Section C (sample 29001) was taken from north rib of 7 west parting, just off main slope. Section D (sample 29000) was taken from face of 3 room in 1 north off of 2 west, 15 feet from entry. Section E (sample 29002) was taken from south rib of main east entry, 200 feet west of pumps.

The ultimate analysis of a composite sample made by mixing samples 28999, 29003, 29001, 29000, and 29002 is given under laboratory No. 29004.

System of mining, room and pillar. In 1917 the coal was undercut by machines and shot down by black powder. The daily average output was 1,100 tons. Track capacity was for 60 empty and 60 loaded railroad cars. The unmined area consisted of 320 acres. The estimated lifetime of the mine was eight years.

PHILLIPS COUNTY.

SPENCER MINE.

Analysis 27221 (p. 47). Lignite, from Spencer mine, in sec. 18, T. 24 N., R. 33 E. Lignite bed, not named; Tertiary age, Fort Union formation. The bed was sampled on September 23, 1917, by A. J. Collier.

Section of coal bed in Spencer mine.

Roof, sandstone:	Ft.	in.
Bone ^a	3	
Parting ^a	1	
Lignite.....	2	10
Clay ^a	1	0
Lignite.....	1	0
Shale ^a	7	
Lignite ^a	1	
Floor, shale.		
Thickness of bed.....	5	10
Thickness of lignite sampled.....	3	10

The sample was cut at face of main entry, 15 feet south of mouth of mine.

NEVADA.

MINERAL COUNTY.

YERINGTON. PROSPECT.

Analysis 30792 (p. 47). Subbituminous coal, field not named, from a prospect 35 miles south of Yerington, Lyon County, in sec. 1, T. 7 N., R. 27 E., on the Nevada Copper Belt R. R. Coal bed, not named; unknown age, unknown formation. The bed was sampled by D. E. Winchester on June 7, 1918, as described below:

Section of coal bed in Yerington prospect.

Roof, shale.	Ft.	in.
Coal, sampled.....	1	8
Shale, brown.....		3
Coal, sampled.....		11
Shale, black.....		1
Coal, sampled.....		3
Shale, black.....	1	1
Coal, sampled.....		8
Floor, not noted.		
Thickness of bed.....	4	11
Thickness of coal sampled.....	3	6

The bed was sampled at face of entry, 30 feet from mouth of prospect. Sample was weathered.

NEW MEXICO.

RIO ARRIBA COUNTY.

LUMBERTON. PROSPECT.

Analysis 31076 (p. 74). Bituminous coal, Monero district, from a prospect drift, in NE. $\frac{1}{4}$ sec. 8, T. 31 N., R. 1 W., $1\frac{1}{2}$ miles southwest of Lumberton, on the narrow-gage line of Denver & Rio Grande R. R. Coal bed, not named; Upper Cretaceous age, Mesaverde formation. Bed is 7 feet 6 inches thick and is nearly horizontal; cleat, not

^a Not included in sample.

noted; general character of the bed, not noted; roof and floor, not noted; cover at the point of sampling, 30 feet. The bed was sampled by M. R. Campbell on September 15, 1918, as described below:

Section of coal bed in Lumberton prospect.

Roof, not noted.	Ft.	in.
Coal ^a	1	6
Coal.....	1	6
Bone ^a		3
Coal.....	2	9
Bone ^a		4
Coal.....	2	2
Floor, not noted.		
Thickness of bed.....	7	6
Thickness of coal sampled.....	6	5

The bed was sampled at face of drift, 50 feet from mouth of prospect. Coal may have been slightly weathered.

MONERO. OLD SIMS MINE.

Analysis 29279 (p. 47). Bituminous coal, Monero field, from Old Sims mine, in SW. $\frac{1}{4}$, sec. 7, T. 31 N., R. 1 E., 1 mile southwest of Monero, on the narrow-gage line of the Denver & Rio Grande R. R. Coal bed, Upper; Upper Cretaceous age, Mesaverde formation. Coal bed was sampled on September 22, 1917, by H. Bassler. Section measured on wall of entry 135 feet from mine mouth. Sample represented 3 feet 6 $\frac{1}{2}$ inches of bed, which was the entire thickness of bed except 8 inches of bone at the top. Sample was weathered, as entry was driven 18 years before the sampling was done. Cover at point of sampling, 30 feet.

SAN JUAN COUNTY.

FARMINGTON. BILL THOMAS MINE.

Analysis 29249 (p. 48). Bituminous coal, San Juan field, from Bill Thomas mine, in NW. $\frac{1}{4}$, sec. 22, T. 32 N., R. 13 W.; no railroad connection. Coal bed, Carbonero; Upper Cretaceous age, Fruitland (?) formation. Lower part of bed, 39 feet 8 inches thick. Sampled on September 18, 1917, by H. Bassler. Section of coal bed sampled was as follows:

Section of part of coal bed in Bill Thomas mine.

Roof, coal and shale.	Ft.	in.
Coal.....	4	5
Shale ^a		6
Coal.....	3	6
Floor, shale.		
Thickness of part of bed.....	8	5
Thickness of coal sampled.....	7	11

Sample was obtained 500 feet northwest of mine mouth, where cover is 50 feet thick.

FARMINGTON. JONES MINE.

Analysis 29250 (p. 48). Bituminous coal, San Juan field, from Jones mine of A. A. Darnell in SE. $\frac{1}{4}$ sec. 21, T. 32 N., R. 13 W., 18 miles northeast of Farmington; no railroad connection. Coal bed, Carbonero; Upper Cretaceous age, Fruitland formation. Upper part of bed 39 feet 6 inches thick; at point sampled 8 feet 4 inches thick. Sampled on September 18, 1917, by H. Bassler.

^a Not sampled.

Section of coal bed in Jones mine.

	<i>Ft. in.</i>
Roof, coal and shale.	
Coal.....	1 11
Shale ^a	5
Coal.....	1 0
Shale ^a	1 0
Coal.....	4 0
Floor, shale.	
Thickness of bed.....	8 4
Thickness of coal sampled.....	6 11

Sample obtained 500 feet south 60° west of mouth of mine.

FARMINGTON. MARCELIOUS MINE.

Analysis 29025 (p. 48). Subbituminous (?) coal, San Juan field, from Marcelious mine, in SW. $\frac{1}{4}$ sec. 28, T. 30 N., R. 15 W., 16 miles northwest of Farmington; no railroad connection. Coal bed, Carbonero; Upper Cretaceous age, Fruitland formation. Sampled on August 14, 1917, by J. B. Reeside, jr.

Section of coal bed in Marcelious mine.

	<i>Ft. in.</i>
Roof, not noted.	
Coal.....	4 6
Shale ^a	2
Coal.....	5
Shale ^a	$\frac{1}{2}$
Coal.....	1 6
Shale ^a	2
Coal.....	4 6
Shale ^a	2
Coal.....	6
Floor, not noted:	
Thickness of bed.....	11 11 $\frac{1}{2}$
Thickness of coal sampled.....	11 5

Sample cut in main slope, 300 feet from mine mouth. Coal was somewhat weathered.

FARMINGTON. PROSPECT.

Analysis 29026 (p. 48). Subbituminous (?) coal, San Juan field, from prospect drift in NW. $\frac{1}{4}$ sec. 16, T. 30 N., R. 15 W., 16 miles northwest of Farmington. Coal bed, upper part of Carbonero bed; Upper Cretaceous age, Fruitland formation. Bed was sampled on August 14, 1917, by J. B. Reeside, jr.

Section of coal bed in Farmington prospect.

	<i>Ft. in.</i>
Roof, not noted:	
Coal.....	2 7
Shale ^a	$\frac{1}{2}$
Coal.....	3 8
Bone ^a	1 1
Floor, not noted:	
Thickness of bed.....	7 4 $\frac{1}{2}$
Thickness of coal sampled.....	6 3

Sample was cut at face of entry, 50 feet from mouth of prospect and was weathered. Thickness of cover at point sampled, 70 feet.

^a Not included in sample.

FARMINGTON. SHIPROCK INDIAN SCHOOL MINE.

Analysis 29006 (p. 48). Bituminous (?) coal, San Juan field (?), from mine of Shiprock Indian School in SW. ¼ sec. 21, T. 30 N., R. 16 W., 25 miles west of Farmington; no railroad connection. Coal bed, not named; Upper Cretaceous age, Mesa-verde formation. Coal bed was sampled on August 11, 1917, by H. Bassler. At point sampled bed was 6 feet 4 inches of thick, clear coal, and was all included in sample. Sample was cut at a point 350 feet down main entry and 150 feet up right entry. The coal was mined to supply the Indian school.

SOCORRO COUNTY.

CARTHAGE. GOVERNMENT MINE.

Analyses 30214 to 30216 (p. 48). Bituminous coal, Carthage field, from Government mine, a slope mine at Carthage, on the New Mexico Midland R. R. Coal bed, Carthage; Cretaceous age, Mesaverde formation. Bed is 5 to 7 feet thick. Several faults and dikes were encountered. Roof, in some parts, a soft sandstone, in other parts a black shale; floor, chiefly sandstone; cover at points of sampling, about 350 feet. The bed was sampled by D. Harrington on March 5, 1918, as described below:

Sections of coal bed in Government mine.

Section.....	A.	B.
Laboratory No.....	30215	30214
Roof, shaly sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 0	3 9
Bone.....	1	
Shale.....		a 3
Coal.....	3 6	1 0
Shale, light-colored.....	a 3	
Coal.....	1 0	
Bone, dark.....	a ?	a 3
Coal.....	7	3
Floor, shale.		
Thickness of bed.....	6 8	5 6
Thickness of coal sampled.....	6 2	5 0

a Not included in sample.

Section A (sample 30215) was taken in 2 room, off 22 slant, off main entry. Section B (sample 30214) was taken in 3 room, off second left, rise room.

The ultimate analysis of a composite sample made by combining equal amounts of face samples 30215 and 30214 is shown under laboratory No. 30216 F.

System of mining, room and pillar. In 1918 all of the coal was hand mined. No powder was used in shooting the coal, the only explosives used being for going through rock dikes. Haulage was by rope. The average daily output was 150 tons.

NORTH DAKOTA.

WARD COUNTY.

BURLINGTON. CONON MINE.

Analyses 31702 to 31705 (p. 48). Lignite from Conon mine, ½ mile east of Burlington, on the Minneapolis, St. Paul & Sault Ste. Marie R. R. Coal bed, Lignite; Tertiary (Eocene) age; Fort Union formation. Bed is 10 to 11 feet thick and lies nearly horizontal; at places dips 1° to southwest; roof, clay over top coal; top coal taken when pillar is drawn; floor, 1 foot of coal, then clay; cover at points of sampling, 100 feet. The bed was sampled by J. G. Schoning on March 28, 1919, as described below:

Sections of coal bed in Conon mine.

Section..... Laboratory No.....	A. 31702	B. 31703	C. 31704
Roof, clay.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof coal.....	<i>a</i> 2 6	<i>a</i> 3 0	<i>a</i> 3 0
Coal.....	2 1	1 4	10
Clay.....	<i>a</i> 1½		
Coal, mushy.....		9	8
Coal.....	4 3½	4 5	4 0
Floor, coal.....			
Thickness of bed.....	6 6	6 6	5 6
Thickness of coal sampled.....	6 4½	6 6	5 6

a Not included in sample.

Section A (sample 31702) was cut at rib 20 feet from face of main entry, 700 feet east of pit mouth. Section B (sample 31703) was cut at face of 2 room, 2 east main entry, 800 feet from opening. Section C (sample 31704) was cut at face of 3 room, main back entry, 600 feet east of mine mouth.

The ultimate analysis of a composite sample made by combining samples 31702, 31703, and 31704 is given under laboratory No. 31705.

System of mining, room and pillar. The coal was shot from the solid with FFF black powder, and in places a little hand cutting was done. Men employed numbered 8 underground and 4 aboveground. The tippie was of wood. At the time of sampling the output was 50 tons a day, 25 per cent of which was derived from advance workings. None of the coal was shipped as run of mine, but all was screened over 2-inch bar screens. Haulage was by mule and rope. The coal was picked on wagons by teamsters and hauled by team to track. The lumps on the cars were large and clean. The estimated lifetime of the mine was 50 years. The capacity of the mine was 50 tons a day, which was equal to the maximum day's run.

WILLIAMS COUNTY.**RAY. PITTSLEY MINE.**

Analyses 29251 and 29253 (p. 49). Lignite from mine of S. F. Pittsley in sec. 29, T. 155 N., R. 96 W., 10 miles southwest of Ray, on the Great Northern R. R.; no railroad connection. Lignite bed, not named; Eocene age, Fort Union formation. Bed is 14 feet 5 inches thick; roof and floor, not recorded. Lignite bed was sampled on September 11, 1917, by A. J. Collier, as follows:

Section of lignite bed in S. F. Pittsley mine.

	A. No. 29251	B. No. 29253
	<i>Ft. in.</i>	<i>Ft. in.</i>
Lignite.....	<i>a</i> 8 7	<i>a</i> 8 7
Clay.....	<i>a</i> 2	2
Lignite.....	3 8	5 8
Lignite.....	<i>a</i> 2 0	
Thickness of bed.....	14 5	14 5
Thickness of lignite sampled.....	3 8	5 8

a Not included in sample.

The samples were gathered in 1 left entry, 100 feet north of mine mouth.

WHEELOCK. JIM MONUEN MINE.

Analysis 29252 (p. 49). Lignite from mine of Jim Monuen, in sec. 29, T. 155 N., R. 97 W., 7 miles southeast of Wheelock, on the Great Northern R. R.; no railroad connection. Lignite bed, not named; Eocene age, Fort Union formation. Observed thickness of bed, $13\frac{1}{2}$ feet; roof and floor, not recorded. Bed lies flat. Sampled on September 12, 1917, by A. J. Collier. Sample was cut in 2 left entry, 300 feet west of mine mouth, and represented 8 feet of lignite, over which was 5 feet 6 inches of lignite.

OHIO.

COLUMBIANA COUNTY.

EAST LIVERPOOL. DELANEY COAL BANK.

Analysis 25592 (p. 49). Bituminous coal, Lisbon field, from Delaney coal bank, 3 miles north of east from East Liverpool, on Smith Ferry Road, in section 36, Liverpool Township. Coal bed, Middle Kittanning; Carboniferous age; Allegheny formation. Roof, bony coal, with dark-olive shale above; floor, clay. The bed was sampled on July 15, 1916, by J. H. Hance, as described below:

Section of coal bed in Delaney coal bank.

	Ft.	in.
Roof, bony coal.		
Bony coal ^a		4
Coal.....	1	6
Clay ^a		2
Coal.....		5
Floor, clay.		
Thickness of bed.....	2	5
Thickness of coal sampled.....	1	11

The section was measured 65 feet north of mine mouth.

EAST LIVERPOOL. DUCK COAL BANK.

Analysis 25589 (p. 49). Bituminous coal, Lisbon field, from Duck coal bank, $3\frac{1}{2}$ miles northeast of East Liverpool, on Smith Ferry Road, in section 36, Liverpool Township. Coal bed, Middle Kittanning; Carboniferous age, Allegheny formation. Roof, bony coal 3 to 5 inches, with dark-olive shale above; floor, clay. The bed was sampled on July 15, 1916, by J. H. Hance, as described below:

Section of coal bed in Duck coal bank.

	t.	in.
Roof, bony coal and dark-olive shale.		
Bony coal ^a		4
Coal.....	1	$7\frac{1}{2}$
Clay ^a		$2\frac{1}{4}$
Coal.....		$2\frac{1}{2}$
Floor, clay.		
Thickness of bed.....	2	$4\frac{1}{4}$
Thickness of coal sampled.....	1	10

The section was measured 50 feet east of north of mine mouth.

^a Not included in sample.

EAST LIVERPOOL. GASTON COAL BANK.

Analysis 25583 (p. 49). Bituminous coal, Lisbon field, from Gaston coal bank, 2½ miles northeast of East Liverpool, in N. ½ sec. 28. Coal bed, Upper Freeport; Carboniferous (Freeport) age, Allegheny formation. Roof, up to 3 inches bituminous shale, with massive sandstone above; floor, fire clay. The coal was sampled on July 15, 1916, by J. H. Hance, as described below:

Section of coal bed in Gaston coal bank.

	Ft.	in.
Roof, shale and sandstone.		
Bone and some coal ^a		1
Coal.....		9
Clay parting.....		$\frac{1}{8}$
Coal.....		4
Clay parting.....		$\frac{1}{8}$
Coal.....	1	$\frac{1}{4}$
Clay parting ^a		$\frac{1}{2}$
Coal.....		5½
Clay bench ^a		1½
Coal.....		3½
Clay.....		3
Floor, fire clay.		
Thickness of bed.....	6	1½
Thickness of coal sampled.....	2	10½

The section was measured in the mine 65 feet northeast of mine mouth.

EAST LIVERPOOL. JOHNSON COAL BANK.

Analysis 25588 (p. 49). Bituminous coal, Lisbon field, from Johnson coal bank, 1½ miles north of East Liverpool, in section 33, middle. Coal bed, Middle Kittanning, Carboniferous age, Allegheny formation. Roof, massive sandstone; floor, fire clay. The bed was sampled on July 15, 1916, by J. H. Hance, as described below:

Section of coal bed in Johnson coal bank.

	Ft.	in.
Roof, sandstone.		
Bone, some coal ^a		1½
Coal.....	1	5
Clay band ^a		1
Coal.....		4½
Clay parting.....		$\frac{1}{4}$
Coal.....		4½
Floor, fire clay.		
Thickness of bed.....	2	4½
Thickness of coal sampled.....	2	2

The section was measured 50 feet north of mine mouth.

EAST LIVERPOOL. KINSEY COAL BANK.

Analysis 25585 (p. 49). Bituminous coal, Lisbon field, from Kinsey coal bank, 2½ miles north of East Liverpool, in SW. ¼ sec. 28. Coal bed, Lower Freeport; Carboniferous age, Allegheny formation. Roof, sandy shale; floor, fire clay. The bed was sampled on July 15, 1916, by J. H. Hance, as described below:

^a Not included in sample.

Section of coal bed in Kinsey coal bank.

	Ft.	in.
Roof, sandy shale.		
Bone and black shale ^a	2	$\frac{1}{2}$
Coal.....	3	
Clay parting.....	$\frac{1}{8}$	
Coal.....	4	$\frac{1}{2}$
Clay parting.....	$\frac{1}{8}$	
Coal.....	3	$\frac{1}{2}$
Clay parting.....	$\frac{1}{8}$	
Coal.....	2	$\frac{5}{8}$
Clay parting ^a	$\frac{1}{2}$	
Bony coal ^a	2	$\frac{1}{2}$
"Sulphur" clay band ^a	2	
Coal.....	7	$\frac{1}{2}$
"Sulphur" streak and clay ^a	1	$\frac{1}{4}$
Coal.....	7	$\frac{1}{2}$
Clay ^a	1	$\frac{1}{2}$
Coal.....	3	$\frac{1}{2}$
Floor, fire clay.		
Thickness of bed.....	3	6 $\frac{3}{4}$
Thickness of coal sampled.....	2	8 $\frac{1}{2}$

The section was sampled in mine 65 feet north of entry mouth.

EAST LIVERPOOL. MALONE'S COAL BANK.

Analysis 25590 (p. 49). Bituminous coal, Lisbon field, from Malone's coal bank, $\frac{1}{2}$ mile north of East Liverpool, in section 24, center. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, massive sandstone; floor, fire clay. The bed was sampled on July 15, 1916, by J. H. Hance, as described below:

Section of coal bed in Malone's coal bank.

	Ft.	in.
Roof, massive sandstone.		
Shale, chocolate ^a	5	$\frac{1}{2}$
Coal, with streaks of bone.....	7	$\frac{1}{2}$
"Sulphur" streaks ^a	$\frac{1}{8}$	
Coal.....	10	$\frac{3}{8}$
"Sulphur" streak and clay ^a	$\frac{3}{8}$	
Coal.....	4	$\frac{3}{4}$
Floor, fire clay.		
Thickness of bed.....	2	4 $\frac{5}{8}$
Thickness of coal sampled.....	1	10 $\frac{5}{8}$

The section was measured in the mine 15 feet northeast of opening.

EAST LIVERPOOL. MOORE'S COAL BANK.

Analysis 25586 (p. 49). Bituminous coal, Lisbon field, from Moore's coal bank, $3\frac{1}{2}$ miles northeast by north of East Liverpool, in SE. $\frac{1}{4}$ sec. 23. Coal bed, Lower Freeport; Carboniferous age, Allegheny formation. Roof, sandy shale; floor, clay (fire clay?). The bed was sampled on July 15, 1916, by J. H. Hance, as described below:

^a Not included in sample.

Section of coal bed in Moore's coal bank.

Roof, sandy shale.	Ft.	in.
Shale, black bituminous ^a	6	
Coal	5½	
Coal	8	
Bony coal	1	
Coal	4	
"Sulphur" clay band ^a	1½	
Coal	1	8½
Bony coal ^a	2	
Floor, clay (fire clay?).		
Thickness of bed	4	½
Thickness of coal sampled	3	3

The section was measured in the mine 60 feet southwest from entry mouth.

EAST LIVERPOOL. SMITH COAL BANK.

Analysis 25584 (p. 49). Bituminous coal. Lisbon field, from Smith coal bank, 4 miles northeast by north of East Liverpool, in W. ½ sec. 24. Coal bed, Middle Kittanning; Carboniferous age, Allegheny formation. Roof, sandy shale; floor, fire clay. The bed was sampled on July 15, 1916, by J. H. Hance, as described below:

Section of coal bed in Smith coal bank.

Roof, sandy shale.	Ft.	in.
Bony coal ^a	1	
Coal	1	2½
Clay parting ^a		¼
Coal	7	
Clay ^a	1	
Coal	6½	
Clay ^a	3	
Floor, fire clay.		
Thickness of bed	2	6½
Thickness of coal sampled	2	4½

The section was measured in the mine 125 feet east from entry mouth.

NEW SALISBURY. McCLAIN MINE.

Analysis 25892 (p. 50). Bituminous coal, Lisbon field, from McClain mine, an entry mine ½ mile northeast of New Salisbury, in section 34, Yellow Creek Township, on the Pennsylvania R. R. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof, chocolate-colored shale and sandstone; floor, clay. The bed was sampled on August 16, 1916, by J. H. Hance, as described below:

Section of coal bed in McClain Fire Brick Co. mine.

Roof, shale and sandstone.	Ft.	in.
Shale, chocolate-colored ^a	3½	
Clay, black bituminous ^a		¼
Coal	1	3½
Clay and pyrite ^a		1½
Coal	1	10½
Clay band ^a		1¼
Coal		10½

^a Not included in sample.

Floor, clay.		Ft. in.
Thickness of bed.....	4	6 $\frac{1}{2}$
Thickness of coal sampled.....	4	1 $\frac{1}{2}$

The section was measured 900 feet east of entry or mine mouth.

WELLSVILLE. AINSWORTH'S COAL BANK.

Analysis 25898 (p. 50). Bituminous coal, Lisbon field, from Ainsworth's coal bank, Wellsville, in section 5, Yellow Creek Township. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, shale; floor, clay. The bed was sampled on August 22, 1916, by J. H. Hance, as described below:

Section of coal bed in Ainsworth's coal bank.

Roof, shale.		Ft. in.
Shale ^a		0
Clay, shale, bone ^a		$\frac{3}{8}$
Coal, irregular partings.....	1	11 $\frac{1}{2}$
Floor, clay.		
Thickness of bed.....	2	$\frac{1}{8}$
Thickness of coal sampled.....	1	11 $\frac{1}{2}$

The section was measured 30 feet south 16° east of mine mouth.

WELLSVILLE. DANGELO COAL BANK.

Analysis 25896 (p. 50). Bituminous coal, Lisbon field, from Dangelo coal bank, Wellsville, in section 15, Yellow Creek Township, on the Pennsylvania R. R. Coal bed, Mahoning (Sharon?); Carboniferous age, Pottsville (?) series. Roof, shale and sandstone; floor, clay. The bed was sampled on August 17, 1916, by J. H. Hance, as described below:

Section of coal bed in Dangelo coal bank.

Roof, shale and sandstone.		Ft. in.
Coal.....		10 $\frac{1}{2}$
Clay and pyrite ^a		$\frac{7}{8}$
Coal.....		9
Clay and pyrite ^a		$\frac{5}{8}$
Coal.....	1	1 $\frac{1}{2}$
Sand parting ^a		$\frac{1}{8}$
Coal.....		6 $\frac{1}{2}$
Floor, clay.		
Thickness of bed.....	3	5 $\frac{1}{8}$
Thickness of coal sampled.....	3	3 $\frac{1}{2}$

The section was measured 40 feet south of mine mouth.

WELLSVILLE. HOUSEHOLDER'S COAL BANK.

Analysis 25894 (p. 50). Bituminous coal, Lisbon field, from Householder's coal bank, 1 $\frac{1}{4}$ miles northwest of Wellsville, in section 11, Yellow Creek Township, on the Pennsylvania R. R. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof, sandstone; floor, clay. The bed was sampled on August 18, 1916, by J. H. Hance, as described below:

^a Not included in sample.

Section of coal bed in Householder's coal bank.

	Ft.	in.
Roof, sandstone.		
Bony coal ^a		1
Coal.....		4 $\frac{3}{4}$
Clay, black.....		$\frac{5}{8}$
Coal.....		7 $\frac{1}{2}$
Clay.....		$\frac{1}{4}$
Coal.....		9
Clay and bone ^a		$\frac{3}{4}$
Coal.....		9
Floor, clay.		
Thickness of bed.....	2	8 $\frac{7}{8}$
Thickness of coal sampled.....	2	7 $\frac{1}{8}$

The section was measured 20 feet south 35° west from mine opening.

WELLSVILLE. SHECKLER COAL BANK.

Analysis 25895 (p. 50). Bituminous coal, Lisbon field, from Sheckler coal bank, Wellsville, in section 5, Yellow Creek Township, on the Pennsylvania R. R. Coal bed, Lower Freeport; Carboniferous age, Allegheny formation. Roof, shale; floor, clay. The bed was sampled on August 18, 1917, by J. H. Hance, as described below:

Section of coal bed in Sheckler coal bank.

	Ft.	in.
Roof, shale.		
Clay shale, bituminous ^a		3 $\frac{1}{2}$
Coal, dirty.....		1 $\frac{1}{4}$
Coal.....		4 $\frac{1}{4}$
Clay, black.....		$\frac{1}{4}$
Coal.....		6
Bone band ^a		1
Coal.....		10
Floor, clay.		
Thickness of bed.....	2	2 $\frac{1}{4}$
Thickness of part sampled.....	1	9 $\frac{3}{4}$

The section was measured 55 feet north 10° west of mine opening.

WELLSVILLE. SMITH'S COAL BANK.

Analysis 25893 (p. 50). Bituminous coal, Lisbon field, from Smith's coal bank, 3 miles northwest of Wellsville, in section 18, Yellow Creek Township. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof, sandy shale and shaly sandstone; floor, clay. The bed was sampled on August 19, 1916, by J. H. Hance, as described below:

Section of coal bed in Smith's coal bank.

	Ft.	in.
Roof, sandy shale and shaly sandstone.		
Bony coal.....		1
Coal.....	1	0
Clay, black.....		$\frac{3}{16}$
Coal.....		6 $\frac{1}{2}$
Clay, black.....		$\frac{1}{2}$
Coal.....		3 $\frac{1}{2}$

^a Not included in sample.

Roof, sandy shale and shaly sandstone—Continued.		Ft.	in.
Clay, black.....			$\frac{1}{4}$
Coal.....			$6\frac{1}{2}$
Clay, black.....			$\frac{1}{4}$
Coal.....	1		$9\frac{1}{4}$
Floor, clay.			
Thickness of bed.....	4		$31\frac{5}{8}$
Thickness of coal sampled.....	4		$31\frac{5}{8}$

The section was measured 150 feet west 12° south of mine opening.

WELLSVILLE. WOOSTER'S CLAY MINE.

Analysis 25897 (p. 50). Bituminous coal, Lisbon field, from Wooster's clay mine, Wellsville, in section 9, on the Pennsylvania R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, shale and clay; floor, clay. The bed was sampled on August 17, 1916, by J. H. Hance, as described below:

Section of coal bed in Wooster's clay mine.

Roof, shale and clay.		Ft.	in.
Bituminous shale ^a			8
Coal.....	1		$1\frac{1}{2}$
Clay ^a			$\frac{3}{8}$
Coal.....	1		$3\frac{1}{2}$
Clay.....			0
Floor, clay.			
Thickness of bed.....	3		$1\frac{3}{8}$
Thickness of coal sampled.....	2		5

The section was measured 100 feet south 80° west of entry mouth.

WELLSVILLE. WOOSTER'S COAL BANK.

Analysis 25900 (p. 50). Bituminous coal, Lisbon field, from Wooster's coal bank, Wellsville, in section 9, on the Pennsylvania R. R. Coal bed, Middle Kittanning; Carboniferous age, Allegheny formation. Roof, chocolate-colored shale; floor, clay. The bed was sampled on August 17, 1916, by J. H. Hance, as described below:

Section of coal bed in Wooster's coal bank.

Roof, shale.		Ft.	in.
Clay, black ^a			1
Coal.....	2		4
Bone ^a			$\frac{1}{4}$
Floor, clay.			
Thickness of bed.....	2		$5\frac{1}{4}$
Thickness of coal sampled.....	2		4

The section was measured 340 feet west of entry mouth.

WEST POINT. WEST POINT MINE.

Analyses 25580 to 25582 (p. 50). Bituminous coal, Lisbon field, from West Point mine, West Point, on the Youngstown & Ohio R. R. (electric). Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof, up to 3 feet bituminous shale under massive sandstone; floor, fire clay. The coal was sampled on July 6, 1916, by J. H. Hance, as described below:

^a Not included in sample.

Sections of coal bed in Kirk-Dunn Coal Co. West Point mine.

Section.....	A. 25580	B. 25581
Laboratory No.....		
Roof, shale under sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>
Shale, chocolate.....		^a 6
Shale, bituminous, coaly.....	^a 2 3	^a 5
Coal.....	1 3½	1 0
"Mother coal".....	^a 1½	
"Sulphur" clay streak.....		^a 7
Coal.....	5	4
"Sulphur" clay streak.....	^a 3	^a 1½
Coal.....	7	1 10
Coal with ⅛-inch "mother coal".....	5	
Coal.....	8	
Clay band, bituminous.....	^a 1½	^a 2½
Coal.....	1 0	1 0
Floor, fire clay.		
Thickness of bed.....	6 9½	5 3½
Thickness of coal sampled.....	4 4½	4 2½

^a Not included in sample.

Section A (sample 25580) was measured 1,800 feet west of south of main entry. Section B (sample 25581) was measured 500 feet northeast of entry.

The ultimate analysis of a composite sample made by mixing samples 25580 and 25581 is given under laboratory No. 25582.

JEFFERSON COUNTY.**CREAM CITY. CREAM CITY MINE.**

Analysis 25899 (p. 51). Bituminous coal, Lisbon field, from Cream City mine, Cream City, on the Pennsylvania R. R. Coal bed, Middle Kittanning; Carboniferous age, Allegheny formation. Roof, chocolate-colored shale; floor, clay. The bed was sampled on August 16, 1916, by J. H. Hance, 340 feet north 20° east from entry mouth. Sample represented 2 feet 4½ inches of coal, the entire thickness of the bed sampled.

EMPIRE. CULP'S COAL BANK.

Analysis 25784 (p. 51). Bituminous coal, Pittsburgh No. 8 field, from Culp's coal bank, 2½ miles south of west of Empire, in section 9, Knox Township, on the Pennsylvania R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Roof, sandstone; floor, bone and clay. The bed was sampled on August 1, 1916, by J. H. Hance, as described below:

Section of coal bed in Culp's coal bank.

	<i>Ft. in.</i>
Roof, sandstone.	
Coal.....	9½
Clay, sandy.....	¼
Coal, few irregular partings.....	1 47½
Clay.....	3
Coal.....	2½
Clay ^a	3
Coal.....	8½
Clay.....	¼
Coal.....	3
Clay.....	½

^a Not included in sample.

Roof, sandstone—Continued.		Ft. in.
Coal.....		5½
Clay ^a		1¾
Bone ^a		3
Floor, bone and clay.		
Thickness of bed.....	4	2¾
Thickness of coal sampled.....	3	10½

The section was measured 275 feet south 35° west from mouth of main entry

IRONDALE. BANFIELD MINE.

Analysis 25785 (p. 51). Bituminous coal, Steubenville field, from Banfield mine, at Irondale, in section 26, Saline Township. Coal bed, Lower Freeport; Carboniferous age, Allegheny formation. Roof, sandy shale; floor, clay. The bed was sampled on August 11, 1916, by J. H. Hance, as described below:

Section of coal bed in Banfield Clay Co. mine.

Roof, shale.		Ft. in.
Clay, shale ^a		1¾
Bone and pyritiferous coal ^a		3
Pyrite, sandy band ^a		2½
Coal.....	1	1¾
Clay with pyrite ^a		1
Coal.....	1	2
Floor, clay.		
Thickness of bed.....	2	9¾
Thickness of coal sampled.....	2	3¾

The section was measured 250 feet south 10° west from main entry mouth, where there were 120 feet of cover.

IRONDALE. BANFIELD No. 3.

Analysis 25787 (p. 51). Bituminous coal, Lisbon field, from Banfield clay mine No. 3, at Irondale, section 26, Saline Township. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, bituminous shale and clay; floor, clay. The bed was sampled on August 11, 1916, by J. H. Hance, as described below:

Section of coal bed in Banfield Clay mine No. 3.

Roof, bituminous shale and clay.		Ft. in.
Bony coal ^a		2¾
Coal.....		4
Clay, black.....		½
Coal.....	2	0
Bone, with pyrite ^a		1½
Floor, clay.		
Thickness of bed.....	2	8¾
Thickness of coal sampled.....	2	4½

The section was measured 400 feet south, 57° east, from main entry.

^a Not included in sample.

IRONDALE. EAST OHIO NO. 2 MINE.

Analysis 25901 (p. 51). Bituminous coal, Lisbon field, from East Ohio No. 2 mine at Irondale, in section 26, Saline Township. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, clay; floor, clay. The bed was sampled on August 16, 1916, by J. H. Hance, as described below:

Section of coal bed in East Ohio Sewer Pipe Co. No. 2 mine.

Roof, clay.	Ft.	in.
Coal	4	$\frac{3}{4}$
Clay		$\frac{1}{4}$
Coal	9	$\frac{1}{2}$
Clay and pyrite ^a		$\frac{3}{8}$
Coal	10	$\frac{1}{2}$
Clay and pyrite ^a	1	
Coal	1	$\frac{1}{4}$
Pyrite, coal, clay ^a	2	$\frac{1}{4}$
Floor, clay.		
Thickness of bed	3	$6\frac{3}{8}$
Thickness of coal sampled	3	$2\frac{1}{4}$

The bed was measured 3,000 feet east of mouth of main entry.

IRONDALE. NICHOLSON COAL BANK.

Analysis 25738 (p. 51). Bituminous coal, Lisbon field, from Nicholson coal bank, Irondale, in section 26, Saline Township. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof, shale and sandstone; floor, bone and fire clay. The bed was sampled on August 11, 1916, by J. H. Hance, as described below:

Section of coal bed in Nicholson coal bank.

Roof, shale, and sandstone.	Ft.	in.
Shale, bituminous	0	
Clay, bituminous ^a		$\frac{1}{4}$
Coal	10	$\frac{3}{8}$
Clay, black		$\frac{8}{16}$
Coal	5	$\frac{3}{8}$
Pyrite band, irregular		$\frac{1}{16}$
Coal	1	$11\frac{1}{2}$
Clay, bench ^a		$1\frac{1}{4}$
Coal	10	
Bone ^a	2	$\frac{1}{4}$
Floor, clay.		
Thickness of bed	4	$6\frac{1}{4}$
Thickness of coal sampled	4	$2\frac{1}{4}$

The section was measured 600 feet west, 10° south, of mouth of main entry.

YELLOW CREEK. LOCAL MINE.

Analysis 25786 (p. 51). Bituminous coal, Pittsburgh or No. 8 field, from mine near New Somerset, 5 miles south of Yellow Creek, Carter Run, in section 16, Knox Township, on the Pennsylvania R. R. Coal bed, Pittsburgh, Carboniferous age, Monongahela formation. Roof, bituminous shale and sandstone; floor, bone and clay. The bed was sampled on August 1, 1916, by J. H. Hance, as described below:

^a Not included in sample.

Section of coal bed in local mine.

	Ft.	in.
Roof, bituminous shale and sandstone.		
Shale, coaly.....	0	
Coal.....	4	
Clay, sandy.....	$\frac{1}{2}$	
Coal.....	$7\frac{1}{2}$	
Clay.....	$\frac{1}{8}$	
Coal.....	$5\frac{1}{8}$	
Clay.....	$\frac{1}{8}$	
Coal.....	$3\frac{1}{2}$	
Clay ^a	$\frac{7}{16}$	
Coal.....	2	
Clay, black.....	$\frac{1}{4}$	
Coal, parting up to $\frac{1}{8}$ inch.....	$5\frac{7}{8}$	
Clay, bony ^a	$\frac{1}{4}$	
Coal, few irregular partings.....	1	$4\frac{1}{4}$
Floor, bone and clay.		
Thickness of bed.....	3	$10\frac{1}{16}$
Thickness of coal sampled.....	3	$9\frac{3}{8}$

The section was measured 150 feet south, 5° west, of mouth of main entry.

YELLOW CREEK. YELLOW CREEK MINE.

Analysis 25890 (p. 51). Bituminous coal, Lisbon field, from Yellow Creek mine, in section 14, Saline Township, at Yellow Creek, on the Pennsylvania R. R. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof, shale and sandstone; floor, clay. The bed was sampled on August 16, 1916, by J. H. Hance, as described below:

Section of coal bed in Yellow Creek mine

	Ft.	in.
Roof, shale and sandstone.		
Shale, bituminous ^a	$4\frac{1}{2}$	
Coal.....	4	$2\frac{1}{2}$
Clay ^a	$1\frac{1}{2}$	
Coal.....	1	7
Clay ^a	$\frac{3}{4}$	
Coal.....	1	2
Bone ^a	3	
Floor, clay.		
Thickness of bed.....	7	$9\frac{1}{4}$
Thickness of coal sampled.....	6	$11\frac{1}{2}$

The section was measured 30 feet west of mouth of entry.

	Ft.	in.
Roof, shale and sandstone.		
Bony coal ^a	$2\frac{1}{2}$	
Coal.....	1	6
Bone and clay ^a	1	
Coal.....	1	0
Bone and clay ^a	$1\frac{1}{4}$	
Coal.....	1	$1\frac{1}{2}$

^a Not included in sample.

and 35 loaded railroad cars. Sixty per cent of the coal was mined in advance work. The daily capacity of the mine in 1918 was 600 tons, the daily average 450 tons, and the maximum day's run 600 tons.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 149, 674.

LEHIGH. FOLSOM MORRIS No. 8 MINE.

Analyses 30713 to 30718 (p. 52). Bituminous coal, Oklahoma field, from Folsom Morris No. 8 mine, a shaft mine, $1\frac{1}{2}$ miles east of Lehigh, in sec. 24, T. 1 S., R. 10 E., on the Missouri, Kansas & Texas, the Chicago, Rock Island & Pacific, and the Atchison, Topeka & Sante Fe Railroads. Coal bed, McAlester; Carboniferous (Allegheny) age, McAlester shale. Bed is 4 to 5 feet thick and dips 4° east; it contains bands of bony coal and "sulphur;" roof, very poor, of shale; floor, rough, of soft shale; entrance, 600 feet above sea level; vertical depth to landings (below entrance), 608 feet. The bed was sampled by W. H. McCoubrey and J. B. Hynal on May 17, 1918, as described below:

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 149, 675.

Sections of coal bed in No. 8 mine.

Section.....	A. 30713	B. 30714	C. 30715	D. 30716	E. 30717
Laboratory No.....					
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, clean.....	7		$8\frac{1}{2}$		
Bony coal.....		$a\ 1\frac{1}{2}$			$a\ 6$
Cannel coal.....				2	
Shale.....	$\frac{1}{16}$		$\frac{1}{16}$	$\frac{1}{16}$	
Coal, clean.....	$6\frac{1}{2}$	$1\ 5\frac{1}{2}$	$4\ \frac{1}{8}$	$4\ \frac{1}{8}$	$1\ 8$
Shale.....	$\frac{1}{16}$			$\frac{1}{16}$	
Coal, soft.....		$7\frac{1}{2}$	$\frac{1}{2}$		
Coal, clean.....	$2\frac{1}{2}$		$\frac{1}{2}$	$7\frac{1}{2}$	
"Sulphur" band.....	$a\ \frac{1}{2}$				$\frac{1}{8}$
Coal, soft.....	$\frac{1}{4}$		$\frac{1}{8}$		
Coal, clean.....	8		2		6
Shale.....	$\frac{1}{16}$	$\frac{1}{16}$		$\frac{1}{16}$	
Coal, clean.....	$1\ 9$	$2\frac{1}{2}$		$5\ \frac{1}{8}$	
"Sulphur" band.....	$a\ \frac{1}{2}$		$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{8}$
Coal, clean.....	2	$1\ 4$	$10\frac{1}{2}$	5	$9\ \frac{1}{8}$
"Sulphur".....					$\frac{1}{8}$
Shale.....			$\frac{1}{16}$	$\frac{1}{16}$	
Coal, clean.....			$1\ 8\frac{1}{2}$	11	$4\frac{1}{2}$
"Sulphur".....			$a\ \frac{1}{2}$		$\frac{1}{8}$
Shale.....				$\frac{1}{16}$	
Coal, clean.....			1	10	$5\frac{1}{2}$
Bony coal.....					$a\ 6$
Floor shale.....					
Thickness of bed.....	$4\ \frac{7}{16}$	$3\ 9\frac{3}{8}$	$4\ 0$	$3\ 8\frac{7}{8}$	$4\ 9\frac{1}{4}$
Thickness of coal sampled.....	$3\ 11\frac{1}{16}$	$3\ 7\frac{3}{8}$	$3\ 11\frac{1}{2}$	$3\ 8\frac{7}{8}$	$3\ 9\frac{1}{4}$

a Not included in sample.

Section A (sample 30713) was cut at the face of 6 south entry, main slope, bottom entry. Section B (sample 30714) was cut at the face of 6 south entry, plane, top entry. Section C (sample 30715) was cut at the face of 7 south entry, plane, top entry. Section D (sample 30716) was cut at the face of 5 north entry, main slope, bottom entry. Section E (sample 30717) was cut at the face of 6 north entry, plane, top entry.

The ultimate analysis of a composite sample made by combining face samples 30713, 30714, 30715, 30716, and 30717 is given under laboratory No. 30718.

System of mining, double room and pillar. In 1918 the coal was cut by hand and shot down with black powder by four shot firers. Men employed numbered 213 underground and 17 aboveground. The tippie was of wood, with self-dumping cage. The total output was shipped as run of mine. The coal was screened through shaking screen 8 by 38 feet, with 4-inch holes. Haulage was by tail ropes and mules. The

appearance of the lump coal on the cars was good. There were four loading tracks, with capacity for 25 empty and 25 loaded railroad cars. About 60 per cent of the coal was taken out in advance work. The daily capacity was 600 tons, the daily average output 450 tons; maximum day's run was equal to the capacity.

PHILIPS. FOLSOM MORRIS NO. 6 MINE.

Analyses 30719 to 30724 (p. 52). Bituminous coal, Oklahoma field, from Folsom Morris No. 6 mine, a shaft mine, 4,000 feet east of Philips, in sec. 2, T. 1 S., R. 10 E., on the Missouri, Kansas & Texas R. R. Coal bed, McAlester; Carboniferous (Allegheny) age, McAlester shale. Bed is 4 to 5 feet thick and dips 9° east. Few faults are encountered in mining, but the bed contains bone and "sulphur" bands. Roof, very poor, of shale; floor, rough, of soft shale; vertical depth to top of coal, 230 feet. The bed was sampled by W. H. McCoubrey and J. B. Hynal on May 22, 1918, as described below:

Section of coal bed in Folsom Morris No. 6 mine.

Section..... Laboratory No.....	A. 30719	B. 30720	C. 30721	D. 30722	E. 30723
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, gray shale.....					
Soft shale.....	^a 3			^a 4	
Coal, clean.....	1 0	3	10	4	1 $\frac{1}{2}$
"Sulphur" band.....		$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
Coal, clean.....	1 3 $\frac{1}{8}$	2	1 2 $\frac{1}{2}$	1 3 $\frac{1}{8}$	4 $\frac{1}{8}$
Coal, soft.....					$\frac{1}{8}$
Coal, clean.....					4 $\frac{1}{2}$
"Sulphur" band.....		$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
Coal, clean.....	2 2 $\frac{1}{8}$	1 9 $\frac{1}{4}$	2 7 $\frac{1}{8}$	10 $\frac{1}{8}$	9 $\frac{1}{8}$
"Sulphur" band.....		$\frac{1}{8}$		$\frac{1}{8}$	$\frac{1}{8}$
Coal, clean.....		1 2 $\frac{1}{8}$		1 11 $\frac{1}{8}$	1 0
"Sulphur" band.....		$\frac{1}{8}$			$\frac{1}{8}$
Coal, clean.....		1 7 $\frac{1}{8}$			$\frac{1}{8}$
"Sulphur" band.....					$\frac{1}{8}$
Coal, clean.....					3
Floor, shale.....					
Thickness of bed.....	4 8 $\frac{1}{8}$	4 11 $\frac{1}{2}$	4 7 $\frac{5}{8}$	4 8	4 6 $\frac{3}{8}$
Thickness of coal sampled.....	4 5 $\frac{3}{8}$	4 11 $\frac{1}{2}$	4 7 $\frac{5}{8}$	4 4	4 5 $\frac{3}{8}$

^a Not included in sample.

Section A (sample 30719) was cut at face of 10 north entry, 6½ slope, top entry. Section B (sample 30720) was cut at face of 10 north entry, main slope, bottom entry. Section C (sample 30721) was cut at face of 11 south entry, main slope, top entry. Section D (sample 30722) was cut at face of 10 south entry, 6½ slope, top entry. Section E (sample 30723) was cut at face of 10 south entry, main slope, top entry.

The ultimate analysis of a composite sample made by combining face samples 30719, 30720, 30721, 30722, and 30723 is given under laboratory No. 30724.

System of mining, double room and pillar. In 1918 the coal was sheared by hand and shot down with black powder at 5 p. m. by three shot firers. Men employed numbered 180 underground and 20 aboveground. The tippie was of wood, with self-dumping cage. Twenty-five per cent of the output was shipped as run of mine. The coal was screened through shaking screens 8 by 38 feet, with 4-inch holes. Haulage was by tail rope, mules, and one electric locomotive. The coal was picked on the car by one picker. There were four loading tracks, with capacity for 20 empty and 25 loaded railroad cars. The lump coal on the cars had a good appearance. Sixty per cent of the coal was taken out in advance work. The capacity of the mine was 600 tons a day, the daily average output 400 tons, and the maximum day's run 600 tons.

HASKELL COUNTY.

McCURTAIN. BLUE RIDGE NO. 3 MINE.

Analyses 69353 to 69356, average of mine-face samples (p. 52). Bituminous coal, McCurtain field, from Blue Ridge No. 3 mine, a slope mine, 1 mile northwest of McCurtain, on the Fort Smith & Western R. R. Coal bed, Panama; Carboniferous age, Hartshorne sandstone. Bed is 3 feet 11 inches to 4 feet 4 inches thick at points of sampling and dips 7° to 8° north; roof, gray shale; floor, soft shale underlain with hard shale and "sulphur" band. The bed was sampled by W. H. McCoubrey on June 1, 1918, as described below:

Sections of coal bed in No. 3 mine.

Section..... Laboratory No.....	A. 69353	B. 69354	C. 69355	D. 69356
Roof, gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 2	2 1	2 2	1 2½
Bone.....	a 1	a 2	a 2	a 2
Coal.....	1 8	2 1	1 7	8½
Bone.....				a 2
Coal.....				1 9
Floor, soft shale, with hard shale and "sulphur" band below.				
Thickness of bed.....	3 11	4 4	3 11	4 0
Thickness of coal sampled.....	3 10	4 2	3 9	3 8

^a Not included in sample.

Section A (sample 69353) was taken at the face of 7 west entry, main slope. Section B (sample 69354) was taken at the face of 6 west entry, main slope. Section C (sample 69355) was taken at the face of 7 east entry, main slope. Section D (sample 69356) was taken at the face of 6 east entry, main slope.

Sixty per cent of the coal was taken out in advance work, and the total recovery claimed was 75 per cent. Haulage was by mules and slope rope. The three loading tracks had capacity for 30 empty and 20 loaded railroad cars. System of mining, room and pillar. The coal was cut both by hand and machine; machine cutting was in shale at the bottom of the coal. Cuttings were not loaded out with the coal. Permissible explosive and permissible powder were used exclusively for shooting down the coal. Men employed numbered 125 underground and 25 on the surface. A wooden tippie equipped with screens and chutes were used. About 50 per cent of the production was shipped as run of mine, 55 per cent of screened sizes as fancy lump and egg coal, and 45 per cent of screened sizes as slack. The slack was coked, and about 275 tons of coke was produced a day. Fragments of roof and floor became mixed with the coal, but miners picked the coal when loading at the face; two pickers cleaned the coal on the cars. There was an inspector of coal at the tippie. Practically the entire output was shipped to points in Oklahoma, Texas, Missouri, and Kansas for steam and domestic purposes. The capacity of the mine was 500 tons a day, and the average daily production in June, 1918, was 325 tons.

McCURTAIN. BLUE RIDGE NO. 4 MINE.

Analyses 29840, 29841, 29843, and 69349 to 69352, mine samples, and 69412 and 69415 to 69419, tippie samples (p. 53). Bituminous coal, McCurtain field, from Blue Ridge No. 4 mine, a slope mine 1¼ miles west of McCurtain, in sec. 21, T. 8 N., R. 22 E., on the Fort Smith & Western R. R. Coal bed, Panama; Carboniferous age, Hartshorne sandstone. Bed is 4 to 4 feet 9 inches thick and dips 7 to 9° north, with poorly defined cleat running east and west. Faults and rolls are encountered, and there is a soft "slate" band in the middle of the coal. Except for a few small "sulphur"

balls, the bed is almost free from impurities. The main roof is hard, gray shale, the immediate roof 6 inches of hard "draw slate." Floor, 2 inches of soft fire clay, overlying hard smooth sandy shale; cover at points of sampling, 164 to 282 feet. The bed was sampled by W. H. McCoubrey on December 21, 1917, as described below:

Sections of coal bed in No. 4 mine, sampled in 1917.

Section.....	A.	B.
Laboratory No.....	29840	29841
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, upper bench.....	1 6	1 5
"Blue band".....	a 1½	a 1
Coal, lower bench.....	2 9	2 9½
Floor, fire clay.		
Thickness of bed.....	4 4½	4 3½
Thickness of coal sampled.....	4 3	4 2½

^a Not included in sample.

Section A (sample 29840) was cut 40 feet from face of main slope, left rib, north. Section B (sample 29841) was cut at face of 4 west entry, main slope.

The ultimate analysis of a composite sample made by combining face samples 29840 and 29841 is given under laboratory No. 29843.

System of mining, room and pillar. In 1917 cutting was done by machine, except in withdrawing pillars, and the coal shot down with black powder and permissible explosive. Men employed numbered 72 underground and 8 aboveground. The tipple was of wood. None of the output was shipped as run of mine. The coal was screened through bar screens 15 feet in length, having 3½-inch spaces. Rope haulage was used on the slope and mule haulage in the mine. The coal was picked on the cars by two pickers. There were two loading tracks, with capacity for 25 empty and 15 loaded railroad cars. The lumps were large, and the appearance of the lump coal and screenings on the cars was good. The screenings were crushed and coked, but not washed. Fifty-five per cent of the coal was taken in advance work, and the recovery was 75 per cent. The unmined area was 300 acres. The daily capacity of the mine in 1917 was 350 tons, the average output 300 tons, and the maximum day's run 347 tons.

The bed was sampled also by W. H. McCoubrey on June 3, 1918, as described below. Commercial samples were taken at the tipple by J. F. Davies and N. H. Snyder on June 10, 1918.

Sections of coal bed in No. 4 mine, sampled in 1918.

Section.....	A.	B.	C.	D.
Laboratory No.....	69352	69349	69351	69350
Roof, main, shale; immediate, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	7½	1½	1 6	1 1
"Sulphur" band.....	¾	¾	a ½	a ¾
Coal.....	2	8½	½	8½
"Sulphur" band.....	¾	a ½		
Bone.....			a 2	
Shale, hard.....				a 2
Coal.....	9	3	7½	2 2
"Sulphur" band.....	a ½	¾	a 2	
Coal.....	7½	11	2 0	
Bone.....	a 2	a 3		
Coal.....	2 0	1 9		
Floor, shale and clay.				
Thickness of bed.....	1 2¾	4 ½	4 6½	4 2
Thickness of coal sampled.....	1 ¾	3 9¼	4 2	3 11¼

^a Not included in sample.

Section A (sample 69352) was taken at the face of 5 west entry, main slope. Section B (sample 69349) was taken at the face of 5 east entry, main slope. Section C (sample 69351) was taken at the face of 5 room, 4 east, main slope. Section D (sample 69350) was taken at the face of 4 west entry, main slope.

Tipple samples 69412, 69416, 69417, and 69418 were lump coal, over 1-inch bar screen; tipple samples 69415 and 69419 were of slack through 1-inch bar screen.

In 1918 permissible explosives were used exclusively for shooting the coal. The mine was trying out panel longwall work and resuming the manufacture of coke in beehive ovens. Men employed numbered 125 underground and 15 aboveground. Coal passing through 1½-inch bar screens was shipped as slack and coked at rate of 275 tons of coke daily. The coal was cleaned by two pickers on railroad cars. There was an inspector of coal at the tipple. At time of sampling in 1918 the coal was shipped to Oklahoma City for railroad and domestic purposes. The capacity of the mine was 500 tons a day, and the average daily output was 325 tons.

McCURTAIN. BLUE RIDGE NO. 5 MINE.

Analyses 29839, 29842, and 29844 (p. 53). Bituminous coal, McCurtain field, from Blue Ridge No. 5 mine, a slope mine 1 mile west of McCurtain, in sec. 21, T. 8 N., R. 22 E., on the Fort Smith & Western R. R. Coal bed, Panama; Carboniferous age, Hartshorne sandstone. Bed is 5 to 6 feet 4 inches thick and dips 16° north 10° west. Cleat running east and west is not well defined. Frequent rolls and faults are encountered in mining. There is a band of soft shale in the middle of the coal. Roof, soft, gray shale, with about 10 inches of "draw slate;" floor, smooth, hard, sandy shale; cover at point of sampling, 115 to 155 feet. The bed was sampled by W. H. McCoubrey on December 21, 1917, as described below:

Sections of coal bed in Blue Ridge No. 5 mine.

Section.....	A. 29839	B. 29842
Laboratory No.....		
Roof, soft gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 5	2 6
"Blue band".....	α 1½	α 1
Coal.....	3 5	3 4
Floor, fire clay.		
Thickness of coal.....	5 11½	5 11
Thickness of coal sampled.....	5 10	5 10

α Not included in sample.

Section A (sample 29839) was taken in 2 west entry off main slope. Section B (sample 29842) was taken in 3 room, 2 east entry, off main slope.

The ultimate analysis of a composite sample made by combining face samples 29839 and 29842 is given under laboratory No. 29844.

System of mining, room and pillar. In 1917 the coal was shot down with permissible explosives by one shot firer. Men employed numbered 38 underground and 8 aboveground. The tipple was of wood. The total production was shipped as run of mine. One picker was employed on the car. The coal was in large lumps and had a good appearance on the cars. There was one loading track, with capacity for 7 empty and 25 loaded railroad cars. About 60 per cent of the coal was taken in advance work, and there was a recovery of about 60 per cent. About 300 acres was unmined. The daily capacity of the mine in 1917 was 125 tons, the daily average 110 tons, and the maximum day's run 170 tons. The output for the year 1917 was 2,000 tons.

STIGLER. STRIP PIT.

Analysis 30344 (p. 53). Bituminous coal, McAlester field, from a strip pit, a small opening 3 miles northwest of Stigler, in sec. 5, T. 9 N., R. 21 E. Coal bed, Stigler; Carboniferous (Allegheny) age, McAlester shale. Bed is about 22 inches thick; floor, clay. The bed was sampled at face by J. J. Rutledge on April 24, 1918, the sample representing 22 inches of coal, the thickness of the bed.

The seam has an overburden of about 12 feet, composed mostly of red clay; 3 to 4 feet of gray shale lie immediately over the coal. The overburden is removed by plows and scrapers, and the coal is broken from the bed by driving iron pins vertically through it. The coal is hauled by teams to the Midland Valley R. R., at Stigler, where part is used locally and part is shipped as blacksmith coal. At time of sampling in 1918 the daily output was 50 tons.

STIGLER. TURNER STRIP PIT.

Analysis 26323 (p. 53). Bituminous coal, high rank, Choctaw field, from H. A. Turner strip pit, 2 miles from Stigler, on the Midland Valley R. R. Coal bed, Stigler (McAlester); Carboniferous age, McAlester shale. Roof, dense, clay shale; floor, clay; no partings. The bed was sampled on October 17, 1916, by D. White near north end of pit. Sample represented 1 foot 10 inches of coal, the entire thickness of bed sampled.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 123, pp. 67, 271.

TAMAHA. NUNNALLY STRIP PIT.

Analysis 26324 (p. 54). Semibituminous coal, Choctaw field, from Floyd Nunnally strip pit, $3\frac{1}{2}$ miles from Tamaha. Coal bed, Stigler (McAlester); Carboniferous age, McAlester shale formation. Roof, clay shale under alluvium; floor, clay. The bed was sampled on October 17, 1916, by D. White. It contains 1 foot $11\frac{1}{2}$ inches clear coal; nothing rejected. The section was measured at active workings in pit.

TAMAHA. OLD SLOPE MINE.

Analysis 30706 (p. 54). Bituminous (?) coal, Stigler field, from Old Slope mine, near Tamaha, in a coal field on the segregated Indian coal lands, in sec. 19, R. 22 E., T. 11 N. Coal bed, Stigler (McAlester (?)); Carboniferous (Allegheny) age, McAlester shale. Roof and floor, soft gray shale. The bed was sampled near mouth of slope by J. J. Rutledge on June 5, 1918. The sample represented 2 feet 5 inches of coal, which is equal to the thickness of the bed. The coal from this mine is of high grade, bright, glossy, and clean. It is used for blacksmith coal and in railroad shops. This part of the coal field is practically virgin, owing to the distance from the railroad. The mine was not in operation.

WHITEFIELD. LIGON STRIP PIT.

Analysis 26325 (p. 54). Bituminous coal, Choctaw field, from J. P. Ligon strip pit, in section 24, 1 mile south and 1 mile west of Whitefield. Coal bed, Stigler; Carboniferous age, McAlester shale. The bed was sampled on October 17, 1916, by D. White. The sample represented 1 foot $8\frac{1}{2}$ inches of coal, the entire thickness of the bed, except $1\frac{1}{2}$ inches of bony coal at the bottom. The section was measured in the face of the stripping.

LATIMER COUNTY.

DEGNAN. M. K. & T. No. 19 MINE.

Analyses 69552, 69542, 69530, 69547, and 69560 (p. 54), average of mine-face samples; analyses 69541 and 69544 (p. 55), average of tippie samples (nut 1½ to 2½ inches); analyses 69532 and 69533, (p. 54), lump over 2½ inches, and analyses 69543 and 69548, slack through 1½-inch screen (p. 55). Bituminous coal, McAlester field, from M. K. & T. No. 19 mine, a shaft mine, ¾ mile west of Degnan, on the Missouri, Kansas & Texas R. R. Coal bed, Lower Hartshorne; Carboniferous (Allegheny) age, McAlester shale. Bed is 5 feet 3 inches to 6 feet 4½ inches thick at points of sampling; dip, 12° to 13° northeast; roof, shale, fairly strong; floor, smooth, gray shale. Commercial samples were taken at the tippie by J. F. Davies and N. H. Snyder on June 19, 1918. The bed was sampled by W. H. McCoubrey on June 19, 1918, as described below:

Sections of coal bed in M. K. & T. No. 19 mine.

Section.....	A. 69552	B. 69542	C. 69530	D. 69547	E. 69560
Laboratory No.....					
Roof, strong gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	4½	5 3	5½	1 5	2 7½
Shale.....	1 1⁄8		1 1⁄8	10½	1 2½
Coal.....	1 4		1 1½	3 3½	2 6½
Shale.....	1 1⁄8		1 5		
Coal.....	1 11		2 9½		
Shale.....	2 5				
Floor, shale.					
Thickness of bed.....	6 3⁄4	5 3	5 9⁄8	5 7½	6 4½
Thickness of coal sampled.....	6 3⁄4	5 3	5 9⁄8	5 7½	6 4½

Section A (sample 69552) was taken from the face of 5 east entry off main slope. Section B (sample 69542) was taken from the face of 2 east entry off inside plane. Section C (sample 69530) was taken from the face of 3 east entry off main slope. Section D (sample 69547) was taken from the face of 4 east entry off main slope. Section E (sample 69560) was taken from the face of 1 east entry off inside plane.

System of mining, room and pillar, entry and air course. The high dip prevents the use of mining machines. A permissible explosive was used for shooting the coal in the slope and in all narrow work; black powder was used in rooms on plane. The miner endeavored to pick out impurities when loading the coal at the face. Men employed numbered 135 in the mine and 26 on the surface. About 35 per cent of the output was shipped as lump, 20 per cent as nut, and 45 per cent as slack. Two pickers worked on the cars when loading lump coal. An inspector of coal was employed at the tippie. At time of sampling 60 per cent of the coal was taken out in advance work, and the total recovery claimed was 60 per cent. Haulage was by mules, electric motor, and rope. There were four loading tracks, with capacity for 30 empty and 30 loaded railroad cars. The coal was shipped to Galveston, Tex., for bunker purposes. The capacity of the mine was 1,000 tons a day, and the average daily output at time of sampling was 600 tons.

GOWEN. ROCK ISLAND No. 40 MINE.

Analyses 30270 to 30277 (p. 55). Bituminous coal, McAlester field, from Rock Island No. 40 mine, a slope mine about 1 mile west of Gowen, in secs. 22, 23, 26, 27, T. 5 N., R. 17 E., on the Chicago, Rock Island & Pacific R. R. Coal bed, Lower Hartshorne; Carboniferous (Allegheny) age, McAlester shale. Bed is 3 to 5 feet thick and dips 6° southwest. Immediate roof is gray shale 1 to 20 inches thick; above this is much harder gray shale 10 to 50 feet thick; then coal averaging 3½ feet thick, and above that

a hard, fine-grained sandstone about 50 feet thick; floor, gray, hard shale. The bed was sampled by J. J. Rutledge, W. W. Fleming, J. B. Hynal, and W. H. McCoubrey on March 14 and 21, 1918, as described below:

Sections of coal bed in Rock Island No. 40 mine.

Section..... Laboratory No.....	A. 30272	B. 30270	C. 30274	D. 30276	E. 30273	F. 30275	G. 30271
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, clean.....	2	9	1 2	1 3	2 5	1 11	1 6
Cannel, coal.....	3½						
Coal, clean.....	4						
Black "sulphur" band.....	½	½	½	½	½	½	
Coal with black "sulphur" bands.....							1 0
Coal, clean.....	6	5	5	7	6	7	1 11½
Black "sulphur" band.....	½	½	½	½	½	½	
Coal, clean.....	11	7½	1	1 ½	1 5½	1 4	
Black "sulphur" band.....	½	½	½	½			
Coal, clean.....	9	1 6	1 11	1 1½			
Black "sulphur" band.....	½						
Coal, clean.....	1 0						
Floor, shale.							
Thickness of bed.....	4 ½	3 4½	3 7½	4 1½	4 4½	3 10½	4 5½
Thickness of coal sampled..	4 ½	3 4½	3 7½	4 1½	4 4½	3 10½	4 5½

Section A (sample 30272) was cut from face of 8 east entry off 41 slope. Section B (sample 30270) was cut from face room 5 in 9 west entry off 41 slope. Section C (sample 30274) was cut from face of 5 east air course off 41 slope. Section D (sample 30276) was cut from face of 5 west entry off 41 slope. Section E (sample 30273) was cut from face of room 50 in 6 west entry off 40 slope. Section F (sample 30275) was cut from face of 6 east entry off 41 slope. Section G (sample 30271) was cut from face room 15 in 7 west entry off 41 slope.

The result of an ultimate analysis of a composite sample made by combining face samples 30270, 30271, 30273, 30274, 30275, and 30276 is shown under laboratory No. 30277 F.

System of mining, entry and air course, room, and pillar. In 1918 no undercutting was done; some shearing was done by the miner after cutting and cracker shots, but most of the coal was blasted off the solid. Permissible explosive was used in the cutting shots and black blasting powder (FF) for blasting off the solid. Rope and mule haulage were employed. The coal was used for steam purposes. The daily output was 600 tons.

RED OAK. HILLING No. 2 MINE.

Analyses 69613, 69630, and 69634, average of mine-face samples, and analyses 69611, 69622, 69627, and 69629, average of tippie samples (p. 55). Bituminous coal, Red Oak field, from Hilling No. 2 mine, a drift mine 3½ miles southeast of Red Oak, on the Chicago, Rock Island & Pacific R. R. Coal bed, Lower Hartshorne; Carboniferous (Allegheny) age, McAlester shale. Bed is 3 feet 10½ inches to 4 feet 1½ inches thick at points of sampling; dip, 28° north; roof, bony coal overlain by shale; floor, bony coal underlain by shale. Commercial samples were taken at the tippie by J. F. Davies and N. H. Snyder on June 24, 1918. The bed was sampled by W. H. McCoubrey on June 24, 1918, as described below.

Sections of coal bed in Hilling No. 2 mine.

Section.....	A. 69613	B. 69630	C. 69634
Laboratory No.....			
Roof, shale and bony coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2		
Bony coal.....		3	3
Shale.....			
Coal.....	$4\frac{1}{2}$	1 $\frac{1}{2}$	$6\frac{1}{2}$
Shale band.....	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
Coal.....	$4\frac{1}{2}$	4	8
Shale band.....	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
Coal.....	1 $8\frac{1}{2}$	5 $\frac{1}{8}$	1 $\frac{1}{8}$
Shale band.....		$\frac{1}{8}$	$\frac{1}{8}$
Coal.....	1 5	2 $\frac{1}{2}$	8
Shale band.....		$\frac{1}{8}$	$\frac{1}{8}$
Coal.....		1 10	$4\frac{1}{2}$
Shale.....			$\frac{1}{8}$
Coal.....			1 9
Floor, bony coal and shale.			
Thickness of bed.....	4 $\frac{3}{4}$	4 $1\frac{3}{8}$	4 $4\frac{3}{8}$
Thickness of coal sampled.....	4 $\frac{3}{4}$	4 $1\frac{3}{8}$	4 $4\frac{3}{8}$

Section A (sample 69613) was taken at the face of 2 east air course, main slope, Section B (sample 69630) was taken at the face of east plane, main slope. Section C (sample 69634) was taken at the face of 1 east entry, main slope.

System of mining, room and pillar, entry and air course. In 1918 the coal was mined by hand and shot down with black blasting powder. Men employed numbered 15 in the mine and 4 on the surface. The coal was dumped over a gooseneck dump, and the entire output was shipped as run of mine. The coal was cleaned by one picker on the cars; the miner picked the coal at the face. At the time of sampling 50 per cent of the coal was taken out in advance work, and the total recovery claimed was 50 per cent. Haulage was by mules. There were two loading tracks, with capacity for 15 empty and 20 loaded railroad cars. At time of sampling the coal was shipped to points in Oklahoma and Texas for steam purposes. The capacity of the mine was 150 tons a day, and the average daily output was 40 tons.

WILBURTON. DEGNAN-McCONNELL NEW NO. 5 MINE.

Analyses 69509, 69510, 69513, 69516, and 69517, average of mine-face samples; analyses 69511, 69512, 69514, and 69515, average of tipple samples, and analyses 27531 to 27535 (p. 55). Bituminous coal from Degnan-McConnell New No. 5 mine, a shaft mine $1\frac{1}{4}$ miles northwest of Wilburton, sec. 8, T. 5 N., R. 19 E., on the Missouri, Kansas & Texas R. R. Coal bed, Upper Hartshorne; Carboniferous (Allegheny) age, McAlester shale. Bed is 3 feet $9\frac{1}{4}$ inches to 4 feet $8\frac{1}{4}$ inches thick at points of sampling. Occasional rolls occur in the seams, but no large faults have been found. Dip, 9° north; roof and floor, hard, gray shale. Commercial samples were taken at the tipple by J. F. Davies and N. H. Snyder on June 8, 1918. The bed was sampled by N. H. Snyder and J. F. Davies on June 17, 1918, as described below:

Sections of coal bed in Degnan-McConnell New No. 5 mine.

Section.....	A. 69509	B. 69510	C. 69513	D. 69516	E. 69517
Laboratory No.....					
Roof, shale	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	4 $\frac{1}{4}$	2 $3\frac{1}{4}$	3 $9\frac{1}{2}$	4 $8\frac{1}{4}$	3 $11\frac{1}{4}$
"Sulphur".....					
Coal.....		1 $5\frac{1}{2}$			
Floor, shale					
Thickness of bed.....	4 $\frac{1}{4}$	3 $9\frac{1}{4}$	3 $9\frac{1}{2}$	4 $8\frac{1}{4}$	3 $11\frac{1}{4}$
Thickness of coal sampled.....	4 $\frac{1}{4}$	3 $9\frac{1}{4}$	3 $9\frac{1}{2}$	4 $8\frac{1}{4}$	3 $11\frac{1}{4}$

Section A (sample 69509) was measured at face of 6 east entry. Section B (sample 69510) was measured at main east entry. Section C (sample 69513) was measured at 12 west entry. Section D (sample 69516) was measured at 10 east entry. Section E (sample 69517) was measured at 10 west entry.

System of mining, room and pillar, entry and air course. In 1918 the coal was undercut by electric chain machines or sheared by hand in narrow work on the plane only. Machine cuttings were loaded out with the coal. Black powder was used on plane in rooms and permissible explosive for shooting down the coal and in machine work. All holes were drilled and shots prepared by the miners, but were tamped and fired from within the mine by shot firers using safety fuse, after all other employees had left the mine. Men employed numbered 159 underground and 15 on the surface. At the time of sampling 60 per cent of the coal was taken out in advance work, and the total recovery claimed was 60 per cent. Haulage was by mule power and a rope haulage system. There were four loading tracks, with capacity for 30 empty and 30 loaded railroad cars. Haulage was by mules and by rope in 1917, at which time no pillars had been drawn, and recovery was about 50 per cent. At time of sampling the coal was dumped from self-dumping cages and shipped as run of mine. The coal was cleaned by two pickers on the cars, and there was an inspector at the tipple. The coal was carefully picked by miners when loading at the face. The coal was shipped to various points in Texas, Oklahoma, and Kansas for domestic and steam purposes. The capacity of the mine was 600 tons a day, and the average daily output at time of sampling was 550 tons.

The bed was sampled by J. J. Rutledge, J. F. Davies, and W. W. Fleming on January 27, 1917, as described below:

Sections of coal bed in New No. 5 mine, sampled in 1917.

Section..... Laboratory No.....	A. 27531	B. 27532	C. 57534	D. 27533
Roof, gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, clean.....	1 8	1 10½	2 9¼	2 1
"Mother coal".....	¼			
"Sulphur".....		⅙	⅙	
"Sulphur," black.....				⅛
Coal, clean.....	7½	3½	1 ¼	1 9¾
"Sulphur".....	α ½			
Coal, clean.....	8			
"Mother coal".....	¼	¼		
Coal, clean.....	10½	1 6		
Floor, hard gray sandy shale.				
Thickness of bed.....	3 11	3 8¼	3 10	3 10¾
Thickness of coal sampled.....	3 10½	3 8¼	3 10	3 10⅝

α Not included in sample.

Section A (sample 27531) was taken from 12 west entry, where 17 room will be turned, 1,200 feet west main shaft. Section B (sample 27532) was taken from 2 room, A entry, 600 feet northeast of main shaft. Section C (sample 27534) was taken from face 15 room, 10 east entry, 1,100 feet southeast main shaft. Section D (sample 27533) was taken from 3 room, B entry, 200 feet north of main shaft.

The ultimate analysis of a composite sample made by combining face samples 27531, 27532, and 27534 is shown under laboratory No. 27535 F.

LE FLORE COUNTY.

BOKOSHE. SLOPE MINE No. 3.

Analyses 26801 and 26802 (p. 56). Semibituminous coal, Choctaw field, from slope mine No. 3, ¼ mile northeast of Bokoshe station, in T. 8 N., R. 24 E., on the Midland Valley R. R. Coal bed, Hartshorne (Panama); Carboniferous age, McAlester

shale. Roof, shale; floor, hard clay. The bed, which averages about 5 feet thick, was sampled by benches on November 3, 1916, by R. V. L. Stratton, as described below:

Sections of coal bed in slope mine No. 3.

Section.....	A.	B.
Laboratory No.....	26801	26802
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, top bench.....	2 10	^a 2 10
Coal, bottom bench.....	^a 3 7	3 7
Floor, hard clay.		
Thickness of bed.....	6 5	6 5
Thickness of coal sampled.....	2 10	3 7

^a Not included in sample.

Sample 26801 was measured in 5 east entry, off slope 1,700 feet east of mine mouth, top bend; 26802 was sampled from bottom bench.

CALHOUN. CENTRAL No. 8 MINE.

Analyses 69461, 69468, 69469, 69470, and 69473, average of face samples; analyses 69460, 69462, 69478, and 69480, average of tipple samples of run of mine coal through 8-inch bar screen; and analyses 69463 and 69483, average of tipple samples of lump over 8-inch bar screen (p. 56). Bituminous coal from Central No. 8 mine, a slope mine at Calhoun, on the Potean Valley R. R. Coal bed, Lower Witteville; Carboniferous age, Savanna (?) formation. Bed is 4 feet $\frac{3}{4}$ inch to 4 feet 6 inches thick; dip, 6°; roof and floor, hard shale with "sulphur" bands. Commercial samples were taken at the tipple by J. F. Davies and N. H. Snyder on June 14, 1918. The coal bed was sampled by W. H. McCoubrey on June 14, 1918, as described below:

Sections of coal bed in Central No. 8 mine.

Section.....	A.	B.	C.	D.	E.
Laboratory No.....	69473	69470	69468	69461	69469
Roof, gray shale with "sulphur" bands.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, clean.....	7	4	6 $\frac{1}{2}$	6 $\frac{1}{2}$	1 6 $\frac{1}{2}$
"Sulphur" band.....	$\frac{1}{2}$	$\frac{1}{4}$		$\frac{1}{4}$	
"Sulphur" and shale band.....					
Coal, clean.....	9	1 $\frac{1}{2}$	1 $\frac{1}{2}$	10 $\frac{1}{2}$	
"Sulphur" band.....	$\frac{1}{4}$				
Coal, clean.....	1 $\frac{1}{4}$				
"Sulphur" band.....	$\frac{1}{8}$				
Shale band "sulphur" and coal.....			^a 3 $\frac{1}{2}$		
Coal, clean.....	1 $\frac{1}{4}$		8		
Shale band and "sulphur".....	^a 3 $\frac{1}{2}$	^a 4			
Shale band, "sulphur," and coal.....			^a 2 $\frac{1}{2}$		
Coal, clean.....	7	8 $\frac{1}{2}$	8 $\frac{1}{2}$		
Shale band and coal.....				^a 3	^a 4 $\frac{1}{2}$
Coal, clean.....				7 $\frac{1}{2}$	8
"Sulphur" and shale.....			$\frac{1}{8}$		
Shale band and coal.....	^a 1 $\frac{1}{2}$	^a 1		^a 1 $\frac{1}{2}$	^a 2
Coal, clean.....	1 8 $\frac{1}{2}$	1 6 $\frac{1}{2}$	1 0	1 7 $\frac{1}{2}$	1 9
Floor, sandy shale with "sulphur" bands.					
Thickness of bed.....	4 $\frac{1}{2}$	4 $\frac{3}{4}$	4 5 $\frac{3}{4}$	4 $\frac{3}{4}$	4 6
Thickness of coal sampled.....	3 11 $\frac{1}{2}$	3 7 $\frac{3}{4}$	3 11 $\frac{1}{2}$	3 8 $\frac{1}{4}$	3 11 $\frac{1}{2}$

^a Not included in sample.

Section A (sample 69473) was cut at face of 8 east entry, main slope. Section B (sample 69470) was cut at face of 11 west entry, main slope. Section C (sample 69468) was cut at face of 13 west entry, main slope. Section D (sample 69461) was cut at face of 7 east entry, main slope. Section E (sample 69469) was cut at face of 12 west entry, main slope.

System of mining, room and pillar. The coal was undercut in the bed by machines and shot down with permissible and black powder by shot firers after regular shift. Men employed numbered 189 underground and 30 aboveground. In 1918, about 60 per cent of the coal was taken out in advance work, and the total recovery claimed was 60 per cent. The unmined area consisted of 900 acres. The estimated lifetime of the mine was 15 years. Haulage was by mules and rope. There were three loading tracks, with capacity for 30 empty and 30 loaded railroad cars. The coal was dumped over a wooden tipple equipped with modern screens. A coal inspector at the mine was employed by the Kansas City & Southern R. R., which takes a large part of the output of the mine, and two pickers cleaned the coal as it was loaded on the railroad cars; the miners picked the coal at the face, but pieces of roof became mixed with the coal loaded out. At the time of sampling the mine was loading 8-inch war lump, an unusual size in this field. The general appearance of the coal on the railroad cars was good. In March, 1919, the mine was loading nothing but run of mine. A modern shaker screen was used 10 feet wide and 40 feet long, with perforations from $\frac{3}{8}$ inch to 2 inches and 6-inch or 8-inch bars.

HOWE. HOWE-McCURTAIN No. 3 MINE.

Analyses 69464, 69465, and 69482, average of mine-face samples, and analyses 69466, 69467, 69479 to 69485, average of tipple samples (p. 57). Bituminous coal, Howe field, from Howe-McCurtain No. 3 mine, a slope mine 3 miles southwest of Howe, on the Chicago, Rock Island & Pacific R. R. Coal bed, Lower Hartshorne; Carboniferous age, McAlester shale. Average thickness of bed, 3 feet 6 inches; dip, 10° north-east; roof, sandstone and fairly strong gray shale; floor, soft shale and bone, in places no bone; usually under main seam lies 1 foot of clean coal, which is left down in rooms and taken up in roadways; 1 foot 3 inches of bone and coal; about half of bottom coal is good. Commercial samples were taken at the tipple by J. F. Davies and N. H. Snyder on June 15, 1918. The bed was sampled by W. H. McCoubrey on June 15, 1918, as described below:

Sections of coal bed in Howe-McCurtain No. 3 mine.

Section.....	A. 69464	B. 69465	C. 69482
Laboratory No.....			
Roof, fairly strong shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	2½		
Coal.....	5	7	1½
Shale and "sulphur" band.....	$\frac{1}{16}$	$a \frac{1}{8}$	$\frac{1}{4}$
Coal.....	2 1½	1½	5
Shale and "sulphur" band.....	$\frac{1}{8}$	$a \frac{1}{8}$	1
Coal.....	2 2	1 ½	4½
"Sulphur" band.....	$a \frac{1}{2}$	$a \frac{1}{4}$	$\frac{1}{8}$
Coal.....	6	1	1 4
"Sulphur".....		$\frac{1}{8}$	$\frac{1}{8}$
Coal.....		1 8	8
Floor, soft shale and bone.			
Thickness of bed.....	3 7½	3 6	3 2
Thickness of coal sampled.....	3 5½	3 5½	3 1

a Not included in sample.

Section A (sample 69464) was taken from face of 4 west entry, main slope. Section B (sample 69465) was taken from face of 6 west entry. Section C (sample 69482) was taken from face of 30 room, 5 entry, main slope. System of mining, room and pillar, entry and air course. Mining machines were not used, but the coal was shot off the solid with black blasting powder. Men employed numbered 41 underground and 7 on the surface. At time of sampling 60 per cent of the coal was taken out in advance work, and a total recovery of 60 per cent was claimed.

Haulage was entirely by mules. There were two loading tracks, with capacity for 8 empty and 15 loaded railroad cars. The coal was dumped over a gooseneck dump and shipped as run of mine. The coal was cleaned by one picker on the railroad cars. There was an inspector of coal at the tipple. Pieces of roof, floor, and partings appeared in the coal as loaded on the railroad cars. In June, 1918, at time of sampling, the coal was shipped to McCurtain, Okla., where it was used for coking purposes; in 1919, the entire output was coked at the mine and very little of the coal was shipped. The capacity of the mine was 300 tons a day, and the average daily production at time of sampling was 125 tons.

WILLIAMS. WILLIAMS No. 1 MINE.

Analyses 69409 to 69411, average of mine-face samples; analyses 69407 and 69408, average of tipple samples of lump over $2\frac{1}{2}$ inches; analyses 69413 and 69414, of slack through $1\frac{1}{4}$ -inch screen, and analyses 69406 and 69420, of nut over $1\frac{1}{4}$ inches, through $2\frac{1}{2}$ -inch screen (p. 57.) Semibituminous coal, Williams field, from Williams No. 1 mine, a slope mine 1 mile west of Williams, on a spur of the Midland Valley R. R. Coal bed, Panama (Lower Hartshorne); Carboniferous age, McAlester shale. Bed is 3 feet 11 inches to 4 feet 2 inches thick; dip, 7° to 9° ; roof, strong, gray shale; floor, shale with bands of coal or of "sulphur." Commercial samples were taken at the tipple by J. F. Davies and N. H. Snyder on June 12, 1918. The bed was sampled by W. H. McCoubrey on June 12, 1918, as described below:

Sections of coal bed in Williams No. 1 mine.

Section..... Laboratory No.....	A. 69409	B. 69410	C. 69411
Roof, strong shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bony coal.....	^a 4	1	^a 1
Coal.....	2	$6\frac{1}{2}$	5
"Sulphur".....	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{8}$
Coal.....	4	.....	$9\frac{1}{2}$
Shale and "sulphur".....	$\frac{1}{8}$	.....	$\frac{1}{8}$
Coal, clean.....	1 $9\frac{1}{2}$	1 $7\frac{1}{2}$	1 0
"Black sulphur" band.....	$\frac{1}{4}$	.....	.....
Coal, clean.....	6	.....	.....
"Sulphur" band and coal mixed.....	.....	$\frac{1}{4}$	$\frac{1}{16}$
"Black sulphur" band.....	$\frac{1}{8}$	.....	.....
Coal, clean.....	9	3	1 $6\frac{1}{2}$
"Sulphur" band.....	.....	$\frac{1}{8}$	.....
Coal, clean.....	.....	1	.....
Sulphur band.....	.....	$\frac{1}{8}$	.....
"Soft coal and sulphur" band.....	.....	.....	$\frac{1}{16}$
Coal, clean.....	.....	1 $6\frac{1}{2}$	1
Floor, shale and "sulphur," A, bony coal.	.....	.....	.....
Thickness of bed.....	3 $11\frac{1}{16}$	4 $2\frac{1}{16}$	3 $11\frac{3}{8}$
Thickness of coal sampled.....	3 $7\frac{1}{16}$	4 $2\frac{1}{16}$	3 $10\frac{3}{8}$

^a Not included in sample.

Section A (sample 69409) was taken from face of 6 west entry, main slope. Section B (sample 69410) was taken from face of 7 west entry, main slope. Section C (sample 69411) was taken from face of 8 west entry, main slope.

System of mining, room and pillar, entry and air course. Mining machines were not used. All the coal was blasted off the solid with permissible explosive and black powder by the shot firers. Men employed numbered 75 underground and 25 on the surface. In 1918, 50 per cent of the coal mined in advance work, and the recovery claimed was 50 per cent. Haulage was by mule and slope rope. There were three loading tracks, with capacity for about 25 empty and 20 loaded railroad cars. The coal was dumped over a crossover dump. One picker was employed on the cars of lump coal and two boys on the cars of nut coal to clean the coal. There was no inspector of coal at the tipple. The miners were said to pick the coal at the face.

The coal was shipped to Kansas City for domestic and steam purposes. The capacity of the mine was 500 tons a day, and the average daily production at time of sampling was 325 tons a day.

For description and analyses of other samples of this coal see Bureau of Mines Bul. 123, pp. 67, 272.

PITTSBURG COUNTY.

ALDERSON. ROCK ISLAND No. 5 MINE.

Analyses 30660 to 30667 (p. 58). Bituminous coal, McAlester field, from Rock Island No. 5 mine, a shaft mine in sec. 22, T. 5 N., R. 15 E., $\frac{1}{4}$ mile southwest of Alderson, on the Chicago, Rock Island & Pacific R. R. Coal bed, McAlester; Carboniferous (Allegheny) age, McAlester shale. Bed is 2 feet 6 inches to 3 feet 4 inches thick and dips 5° to 10° southwest. A few faults are encountered. The coal was very clean, with practically no bands or impurities. Roof is very poor gray shale and floor is smooth hard shale. The bed was sampled by W. H. McCoubrey and J. B. Hynal on May 1 and 3, 1918, as described below.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 85, pp. 65, 253.

Sections of coal bed in Rock Island No. 5 mine.

Section..... Laboratory No.....	A. 30660	B. 30661	C. 30662	D. 30663	E. 30664	F. 30665	G. 30666
Roof, gray shale.	<i>Ft. in.</i> <i>a</i> 2	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....							
Coal, clean.....		6 $\frac{1}{2}$	4	2		3 $\frac{1}{2}$	4 $\frac{1}{2}$
Black "sulphur" band.....		3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$		3 $\frac{1}{2}$	3 $\frac{1}{2}$
Coal, clean.....		1 0	5 $\frac{1}{2}$	6 $\frac{1}{2}$		2 $\frac{1}{2}$	1 5 $\frac{1}{2}$
Coal with "sulphur" bands.....	8			4			
Coal, clean.....	5 $\frac{1}{2}$			3 $\frac{1}{2}$			
Black "sulphur" band.....		3 $\frac{1}{2}$	1 1 $\frac{1}{2}$	2 $\frac{1}{2}$		5 $\frac{1}{8}$	2 1 $\frac{1}{2}$
Coal, clean.....	2 4 $\frac{3}{4}$	3 $\frac{1}{2}$	1 6 $\frac{1}{2}$	3 $\frac{1}{2}$		2 $\frac{1}{2}$	
Black "sulphur" band.....		5	1	3 $\frac{1}{2}$			
Coal, clean.....					1 $\frac{1}{2}$		
Coal with shale band.....					3 $\frac{1}{2}$		
Black "sulphur" band.....		1 2 $\frac{1}{2}$		3	6 $\frac{1}{2}$	2 5 $\frac{1}{2}$	
Coal, clean.....							
Black "sulphur" band.....					3 $\frac{1}{2}$		
Coal, clean.....				1 9	2 8 $\frac{1}{2}$		
Floor, gray shale.							
Thickness of bed.....	3 7 $\frac{1}{2}$	3 4 $\frac{5}{8}$	3 4 $\frac{1}{2}$	3 10	3 4 $\frac{1}{2}$	3 6 $\frac{1}{2}$	3 10 $\frac{1}{2}$
Thickness of coal sampled..	3 5 $\frac{1}{2}$	3 4 $\frac{5}{8}$	3 4 $\frac{1}{2}$	3 10	3 4 $\frac{1}{2}$	3 6 $\frac{1}{2}$	3 10 $\frac{1}{2}$

a Not included in sample.

Section A (sample 30660) was measured at face of 5 east entry off main west slope. Section B (sample 30661) was measured at face of 5 west entry off main west slope. Section C (sample 30662) was measured at face of 7 east entry off main west slope. Section D (sample 30663) was measured at face of 3 west entry off main west slope. Section E (sample 30664) was measured at face of 9 west entry off main west slope. Section F (sample 30665) was measured at face of 4 west entry off 1 slope east side. Section G (sample 30666) was measured at face of 5 east entry off slope 1 east side of mine.

The ultimate analysis of a composite sample made by combining face samples 30660, 30661, 30662, 30663, 30664, 30665, and 30666 is given under laboratory No. 30667.

System of mining, room and pillar. In 1919 the coal was shot down with permissible explosives exclusively by two shot firers after the miners had left the mine; machines were employed for cutting the coal; at time of sampling, however, some black powder was used in east side workings. Haulage was by mules and two electric motors. In 1918 the entire production was shipped as run of mine. The steel tippie had screens

8 by 12 feet. Sizes of coal were lump, nut, pea, and slack. At the steel tippie the coal was picked on table by two pickers. There were four loading tracks, with capacity for 25 empty and 25 loaded railroad cars. The appearance of lump coal and the screenings on the cars was good. The estimated recovery of the mine was about 45 to 50 per cent. The unmined area and the lifetime of the mine were unknown. The mine is old and expensive to operate. The daily capacity at time of sampling was about 500 tons; the daily average 425 tons, and the maximum day's run 500 tons.

ALDERSON. ROCK ISLAND NO. 38 MINE.

Analyses 30656 to 30659 (p. 58). Bituminous coal, McAlester field, from Rock Island No. 38 mine, a slope and shaft mine ½ mile east of Alderson, in secs. 24 and 19, T. 5 N., Rs. 15 and 16 E., on a spur track of the Chicago, Rock Island & Pacific R. R. Coal bed, McAlester; Carboniferous age, Pennsylvania group, McAlester shale. Average thickness of bed, 3 feet 3 inches; dip, 16° southwest; roof, poor, of very brittle gray shale; floor, rather soft, gray shale that heaves readily. The bed was sampled by W. H. McCoubrey and J. B. Hynal on May 4, 1918, as described below:

Sections of coal bed in Rock Island No. 38 mine.

Section.....	A. 30656	B. 30657	C. 30658
Laboratory No.....			
Roof, gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal with very thin bands shale.....	1		
Coal, clean.....	3½	4	1
Coal, soft.....		½	
Black "sulphur" band.....	¾	¾	¾
Coal, clean.....	6	1 9	7½
"Sulphur" and soft coal.....	⅛		
Shale band.....		⅞	
Coal, clean.....	1	6½	
Black "sulphur" band.....		¾	¾
"Sulphur" and soft coal.....	¾		
Coal, clean.....	11½	4	1
Black "sulphur" band.....			¾
Coal, clean.....	1 7		7
Black "sulphur" band.....			5
Coal, clean.....			¾
Black "sulphur" band.....			8½
Coal, clean.....			
Floor, soft gray shale.			
Thickness of bed.....	3 6⅞	3 1⅞	2 8⅞
Thickness of coal sampled.....	3 6⅞	3 1⅞	2 8⅞

Section A (sample 30656) was taken from face of 9 west entry off main slope. Section B (sample 30657) was taken from face of 6 east entry off main west slope. Section C (sample 30658) was taken from face of main east entry off main slope.

The ultimate analysis of a composite sample made by combining face samples 30656, 30657, and 30658, is given under laboratory No. 30659.

System of mining, entry and air course, room and pillar. In 1918 all coal was blasted off the solid with FF black blasting powder; permissible explosive was used exclusively in the cutting shots in narrow places. Haulage was by rope and mule. The daily output of the mine in 1918 was 100 tons.

BUCK. BUCK NO. 22 MINE.

Analysis 26150 (p. 58). Bituminous coal, McAlester field, from Buck No. 22 mine, a slope mine 1 mile east of Buck and 5 miles from McAlester, in sec. 12, T. 5 N., R. 15 E., on the Missouri, Kansas & Texas R. R. Coal bed, Upper Hartshorne; Carboniferous age, McAlester shale. Bed is 2 feet 10 inches thick; dip, 12° southwest, with cleat; roof, gray shale; floor, gray shale; cover at point of sampling, about 300 feet. The bed was sampled by J. J. Rutledge and W. W. Fleming, on September 22, 1916, as described below:

Section of coal bed in Buck No. 22 mine.

	Ft.	in.
Roof, gray shale.		
Coal.....		4
"Mother coal".....		$\frac{1}{4}$
Coal, clean.....	2	6
Floor, gray shale.		
Thickness of bed.....	2	10 $\frac{1}{4}$
Thickness of coal sampled.....	2	10 $\frac{1}{4}$

The sample was cut at 1 east bottom entry, 6 feet from face of slope.

System of mining, room and pillar. In 1916 the coal was shot off the solid with FF black blasting powder. Men employed numbered 4 underground and 1 aboveground. The tipple was of wood. Haulage was by mules and slope rope. The coal was picked on car by one picker. There were no loading tracks at time of sampling, as the mine had just been opened; all coal produced was hauled to the railroad by wagon. At time of sampling the output was 12 to 15 tons a day, all of which was derived from advance workings. The entire output was shipped as run of mine. The daily capacity of the mine was 200 tons. In October, 1919, the mine was producing 135 tons a day, and railroad tracks had been laid to the mine.

CARBON. CARBON NO. 2 MINE.

Analyses 69527, 69535, 69546, average of mine-face samples; analyses 69529 and 69531, lump, over 2 $\frac{1}{2}$ inches; analyses 69545 and 69562, chestnut, $\frac{3}{4}$ inch to 1 $\frac{1}{4}$ inches; analyses 69528 and 69534, nut, 1 $\frac{1}{4}$ inches to 2 $\frac{1}{2}$ inches; and analyses 69540 and 69554, slack, under $\frac{3}{4}$ inch (p. 58). Bituminous coal, McAlester field, from Carbon No. 2 mine, a slope mine 1 mile east of Carbon, on the Missouri, Kansas & Texas R. R., Wilburton branch. Coal bed, McAlester; Carboniferous age, McAlester shale. Bed is 2 feet 8 $\frac{1}{2}$ inches to 3 feet 1 inch thick; dip, 18° to 16° north, with a lower dip at face of slope; roof, shale; floor, hard, smooth shale. Commercial samples were taken at the tipple by J. F. Davies and N. H. Snyder on June 20, 1918. The bed was sampled by W. H. McCoubrey on June 20, 1918, as described below:

Sections of coal bed in Carbon No. 2 mine.

Section.....	A. 69527	B. 69535	C 69546
Laboratory No.....			
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1	1	1 $\frac{1}{2}$
Shale band.....	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{3}{8}$
Coal.....	1	1 3	2 $\frac{1}{2}$
Shale band with "sulphur".....	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$
Coal.....	1	1 9	7
Shale band.....	$\frac{1}{8}$		$\frac{1}{16}$
Coal.....	8		11 $\frac{1}{2}$
Shale band.....	$\frac{1}{16}$		$\frac{1}{16}$
Coal.....	4		3
Shale band.....	$\frac{1}{16}$		$\frac{1}{16}$
Coal.....	1 8 $\frac{1}{2}$		7
Floor, shale.			
Thickness of bed.....	3 0	3 1 $\frac{1}{8}$	2 8 $\frac{1}{2}$
Thickness of coal sampled.....	3 0	3 1 $\frac{1}{8}$	2 8 $\frac{1}{2}$

Section A (sample 69527) was taken at the face of 5 west entry, main slope. Section B (sample 69535) was taken at the face of 7 east entry, main slope. Section C (sample 69546) was taken at the face of 6 west entry, main slope.

System of mining, room and pillar, entry and air course, the air course being above entry. Mining was by hand, and both black blasting powder and permissible explosives were used for shooting down the coal. Pieces of shale from the roof and floor

became mixed with the coal, but the miner endeavored to pick them out at the face. Men employed numbered 67 in the mine and 13 on the surface. In 1918, 50 per cent of the coal was taken out in advance work, and a total recovery of 55 per cent was claimed. Haulage was by mules. The four loading tracks had capacity for 20 empty and 20 loaded railroad cars. The coal was screened and shipped in prepared sizes as follows: Lump, 43 per cent; nut, 15 per cent; chestnut, 11 per cent, and slack, 31 per cent of total output of mine. Two men were employed to pick slate and move railroad cars. The weigh boss inspected both mine car and railroad car. The coal was shipped to various points in Texas, Oklahoma, and Kansas, and to Omaha, Nebr., where it was used for domestic and steam purposes. It is among the best prepared domestic coals in Oklahoma. At time of sampling the capacity of the mine was 300 tons a day, and the average daily output was 200 tons; an increase in labor would be necessary to increase output to capacity.

HAILEYVILLE. HAILEY-OLA No. 2 MINE.

Analyses 30398 to 30400 (p. 59). Bituminous coal, McAlester field, from Hailey-Ola No. 2 mine, a slope mine 1 mile south of Haileyville, in T. 5 N., R. 17 E., on the Chicago, Rock Island & Pacific R. R. Coal bed, Upper Hartshorne; Carboniferous (Allegheny) age, McAlester shale. Bed is 3 feet to 3 feet 4 inches thick; dip, 25° to 30° west. A few faults are encountered; no rolls or horsebacks. Roof, rough, soft, gray shale, fairly strong, frequent slips; floor, rough, soft, gray shale. The bed was sampled by W. H. McCoubrey and J. B. Hynal on April 12, 1918, as described below:

Sections of coal bed in Hailey-Ola No. 2 mine.

Section.....	A. 30398	B. 30399
Laboratory No.....		
Roof, shale.....	<i>Ft. in</i>	<i>Ft. in.</i>
Coal, bony.....	^a 3	^a 3
Coal, clean.....	1 5	1 4
Coal and fire clay mixed.....	^a 2½	
Coal, bony.....	2	
Black "sulphur" band.....		^a ½
Coal, clean.....		6
Soft fire clay.....		½
Coal, clean.....	11	1 0
Coal, bony.....	1	^a ¾
Coal, clean.....	4	5
Floor, shale.....		
Thickness of bed.....	3 4½	3 7
Thickness of coal sampled.....	3 1½	3 4

^a Not included in sample.

Section A (sample 30398) was cut at face of l south entry, main slope. Section B (sample 30399) was cut at face of l north entry, main slope.

The ultimate analysis of a composite sample made by combining face samples 30398 and 30399 is given under laboratory No. 30400 F.

System of mining, room and pillar. In 1918 coal was shot down with permissible explosive in entries and narrow places by two shot firers. Four men were employed underground and one man aboveground. The tipple was of wood. The total production was shipped as run of mine. Haulage was by pushers. One picker was employed on the car. There was track capacity for six empty and six loaded railroad cars. The appearance of the lump coal on the cars was good. The capacity of the mine was 150 tons a day and the average output 75 tons. In 1919 the mine was developed to third left; thickness, 3 feet to 3 feet 6 inches. Mules were used for haulage in entries. Capacity, 300 tons; daily output, 150 tons.

HAILEYVILLE. BLUE CREEK No. 7 MINE.

Analyses 30401 to 30403 (p. 59). Bituminous, McAlester field, from Blue Creek No. 7 mine, a slope mine $1\frac{1}{2}$ miles south of Haileyville, in T. 5 N., R. 17 E., on the Chicago, Rock Island & Pacific R. R. Coal bed, Lower Hartshorne; Carboniferous (Allegheny) age, McAlester shale. Bed is 3 feet 6 inches to 6 feet thick; dip, 50° west. Thin bands of shale are occasionally encountered. Roof, gray shale on south side of mine, roof coal on north side; floor, 2 inches of fire clay, then hard shale; fairly smooth. The bed was sampled by W. H. McCoubrey and J. B. Hynal on April 12, 1918, as described below:

Sections of coal bed in Blue Creek No. 7 mine.

Section.....	A.	B.
Laboratory No.....	30401	30402
Roof, section A, shale; section B, coal.	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	^a 1	
Coal, clean.....	5 $\frac{1}{2}$	1 6
Bone.....	$\frac{1}{2}$	$\frac{1}{2}$
Coal, clean.....	6	1 3
Coal, cannel.....	2	
Black "sulphur" band.....		$\frac{1}{8}$
Coal, clean.....	1 4	2 10
Bone.....	$\frac{1}{4}$	^a 2
Coal, clean.....	1 2	
Floor, hard shale.		
Thickness of bed.....	3 9 $\frac{1}{4}$	5 9 $\frac{5}{8}$
Thickness of coal sampled.....	3 8 $\frac{1}{4}$	5 7 $\frac{3}{8}$

^a Not included in sample.

Section A (sample 30401) was cut at face of 1 south entry, main slope. Section B (sample 30402) was cut at face of 1 north entry, main slope.

The ultimate analysis of a composite sample made by combining face samples 30401 and 30402 is given under laboratory No. 30403.

System of mining, room and pillar. In 1918 it was shot down with black powder and permissible explosive by two shot firers. Men employed numbered 16 underground and 3 aboveground. The tippie was of wood. The total output was shipped as run of mine. Haulage was by mules and pushers. The coal was picked on the car by one picker. There were two loading tracks, with capacity for six empty and six loaded railroad cars. The appearance of the lump coal on the cars was good. The daily capacity was 150 tons, the average 75 tons, and the maximum day's run 101 tons.

KREBS. OSAGE No. 5 MINE.

Analyses 69549, 69550, and 69556, average of mine-face samples; analyses 69551 and 69558, average of tippie samples of slack through $\frac{5}{8}$ -inch screen; analyses 69553 and 69557, of lump over $2\frac{1}{2}$ inches; analyses 69555 and 69561, of nut through $2\frac{1}{2}$ -inch screen; and analyses 69559 and 69563, of pea through $\frac{7}{8}$ -inch screen (p. 59). Bituminous coal, McAlester field, from Osage No. 5 mine, a shaft mine $1\frac{1}{4}$ miles northwest of Krebs, on the Missouri, Kansas & Texas R. R. Coal bed, McAlester; Carboniferous (Allegheny) age, McAlester shale. Average thickness of bed is 4 feet; dip, 9° to 12° ; roof, hard shale; floor, hard, gray shale. Commercial samples were taken at the tippie by J. F. Davies and N. H. Snyder on June 21, 1918. The bed was sampled by W. H. McCoubrey on June 21, 1918, as described below:

Sections of coal bed in Osage No. 5 mine.

Section.....	A. 69549	B. 69550	C. 69556
Laboratory No.....			
Roof, fairly strong, gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2½	2½	2
Shale and "sulphur" band.....	¾	¾	¾
Coal.....	2	3	3½
Shale and "sulphur" band.....	¾	¾	¾
Coal.....	5½	5½	2½
Shale and "sulphur" band.....	¾	¾	¾
Coal.....	2	2½	2
Shale and "sulphur" band.....	¾	¾	¾
Coal.....	6	7½	4½
Shale and "sulphur" band.....	¾	¾	¾
Coal.....	7½	6	3
Shale and "sulphur" band.....	¾	¾	¾
Coal.....	1	1 9	4
Shale and "sulphur" band.....	¾	¾	¾
Coal.....	1 11½		2 4
Floor, smooth, hard shale.			
Thickness of bed.....	4 1½	4 0	4 1½
Thickness of coal sampled.....	4 1½	4 0	4 1½

Section A (sample 69549) was taken from the face of 8 west entry, east slope. Section B (sample 69550) was taken from the face of 2 west entry, west slope. Section C (sample 69556) was taken from the face of 6 east entry, east slope.

System of mining, room and pillar. In 1918 the coal was mined entirely by machine and shot down with permissible explosive only. Men employed numbered 150 in the mine and 22 on the surface. The coal was dumped from self-dumping cages and passed over shaker screens. Sizes of coal: Domestic lump, 9 per cent; nut and pea, 4 per cent; mine run, 32 per cent; pea and slack, 1 per cent; slack, 22 per cent. In 1918, 60 per cent of the coal was taken out in advance work and represented entire percentage of recovery, as pillars were drawn to some extent. Haulage was by mules and by rope. The four loading tracks had capacity for 25 empty and 30 loaded railroad cars.

RIDGWAY. ROCK ISLAND NO. 10 MINE.

Analyses 30222 to 30227 (p. 60). Bituminous coal, McAlester field, from Rock Island No. 10 mine, a shaft mine ½ mile east of Ridgway, in sec. 33, T. 5 N., R. 17 E., on the Chicago, Rock Island & Pacific R. R. Coal bed, Lower Hartshorne; Carboniferous (Allegheny) age, McAlester shale. Bed is 2 to 5 feet thick, is level, with cleat running north and south. Thin bands of black "sulphur" are encountered, usually near the center of coal. Roof, soft, gray shale, with frequent slips; floor, similar to roof, hard. The bed was sampled by W. H. McCoubrey and J. B. Hynal March 8, 1918, as described below:

Sections of coal bed in Rock Island No. 10 mine.

Section.....	A. 30222	B. 30223	C. 30224	D. 30225	E. 30226
Laboratory No.....					
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, clean.....	10	1 0	1 6	2 4	2 9
Black "sulphur" band.....		¾	¾	¾	¾
Coal, clean.....	1 6	1 0	11	2 0	2 0
Black "sulphur".....	¾	¾	¾		
Coal, clean.....	1 6	6	1 5		
Floor, shale.					
Thickness of bed.....	3 10	2 6	3 10	4 4	4 9
Thickness of coal sampled.....	3 10	2 6	3 10	4 4	4 9

Section A (sample 30222) was measured at the face of main east entry. Section B (sample 30223) was measured at the face of main west entry. Section C (sample 30224) was measured at the face of 27 room, main west entry. Section D (sample 30225) was measured at the face of east air course, main north entry. Section E (sample 30226) was measured at 6 east entry, main south.

The ultimate analysis of a composite sample made by combining face samples 30222, 30223, 30224, 30225, and 30226 is given under laboratory No. 30227 F.

System of mining, room and pillar. In 1918 the coal was cut by machine and shot down with permissible explosive by three shot firers. Men employed numbered 162 underground and 11 aboveground. The tippie was of steel. The total output was shipped as run of mine. Haulage was by one electric locomotive and by mules. The coal was picked on car by two pickers. There were three loading tracks, with capacity for 30 empty and 30 loaded railroad cars. The appearance of the lump coal on cars was good. The daily capacity of the mine was 1,000 tons, the average 650 tons, and the maximum day's run 730 tons.

SEQUOYAH COUNTY.

HANSON. BREWER STRIP PIT.

Analysis 26800 (p. 60). Semibituminous coal, Cherokee field, from James Brewer et al. strip pit, 1 mile north of Hanson station, in sec. 6, T. 11, R. 25 E., on the Iron Mountain R. R. Coal bed, not named (?); Carboniferous age, McAlester shale. Roof, shale; floor, clay. The bed was sampled November 2, 1916, by R. V. L. Stratton, the sample representing 12 inches of coal, the thickness of the bed. The section was measured at north edge of pit.

WAGONER COUNTY.

REDBIRD. KIRK STRIP PIT.

Analysis 26348 (p. 60). Bituminous coal, Cherokee field, from Ed. Kirk strip pit, 1½ miles northeast of Redbird. Coal bed, not named (?); Carboniferous age, Cherokee shale. Roof, blue shale, marine fossils; floor, clay. The bed was sampled October 20, 1916, by D. White, the samples representing 9½ inches of clear coal, with charcoal layer 2 inches below top; total thickness of the bed, 9½ inches. The section was measured in face of stripping.

OREGON.

COOS COUNTY.

BEAVERHILL. BEAVERHILL MINE.

Analysis 27951 (p. 60). Subbituminous coal, Coos Bay field, from Beaverhill mine, a slope mine at Beaverhill, in sec. 17, T. 27 S., R. 13 W., on a branch line of the Southern Pacific R. R. Coal bed, Newport; Eocene age, Coaledo (?) formation. Bed is 7 feet 11½ inches thick; dip, 26° to 40°; roof and floor, shale; cover at point of sampling, 1,500 feet; elevation above sea level, 60 feet. The bed was sampled by G. W. Evans on March 27, 1917, as described below:

Section of coal bed in Beaverhill mine.

	Ft. in.
Roof, shale.	
Shale <i>a</i>	6
Coal <i>a</i>	2
Shale <i>a</i>	1½
Coal.....	3 0
Shale <i>a</i>	6

Roof, shale—Continued.		Ft. in.
Coal.....	1	6
Coal, bony.....	8	
Bone <i>a</i>	1	6
Floor, shale.		
Thickness of bed.....	7	11½
Thickness of coal sampled.....	5	2

The sample was taken at face of 8 gangway, north.

System of mining, in levels, 8-foot chutes being driven at about 50-foot centers. Beaverhill has been developed at large expense, but because of excessive heaving of the floor costs of operation are very high. The distance between levels is approximately 340 feet. In 1917 the coal was shot off the solid. At the time of sampling 25 men were employed underground and 12 aboveground. The tippie was of wood. All coal was hand picked or washed and passed through 1½-inch screens. Two pickers were employed. Haulage was by electric motor. Fifteen per cent of the coal was taken out in advance work. In 1917 the daily capacity was 200 tons and the daily average output 40 tons; it was entirely used by the Southern Pacific R. R., which owns the property. In 1919 the coal was extracted on the retreating system, largely decreasing the expense of maintenance from heaving. In addition to being used by the Southern Pacific R. R., the coal was sold locally and the production was increased to a daily average of 60 tons. It was expected the demand could be increased to 200 tons daily by the autumn of 1919.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 152, 684.

HENRYVILLE. HENRYVILLE MINE.

Analysis 27956 (p. 60). Subbituminous coal, Coos Bay field, from Henryville mine, a slope mine at Henryville, on a branch of the Southern Pacific R. R. Coal bed, Newport; Eocene age, Coaledo formation. Bed is 6 feet 4 inches thick; dip, 26°; roof and floor, shale; cover at point of sampling, 300 feet. The bed was sampled by G. W. Evans on March 24, 1917, as described below:

Section of coal bed in Henryville mine.

Roof, shale.		Ft. in.
Shale <i>a</i>	6	
Coal, bony.....	2	
Shale <i>a</i>	1	
Coal.....	2	4
Shale <i>a</i>	6	
Coal.....	1	6
Floor, black shale.		
Thickness of bed.....	5	1
Thickness of coal sampled.....	4	0

The sample was cut at 2 south gangway.

System of mining, breast and pillar. In 1917 it was cut by machine to a depth of 7 feet. At time of sampling 4 men were employed aboveground and 21 underground. The tippie was of wood; 30 per cent of the coal passed through bar screens with 1-inch space; 50 per cent was lump coal and 20 per cent nut coal. Haulage was by mules. One picker was employed. There was track capacity for 5 empty and 15 loaded cars. Fifty per cent was taken out in advance work, and the recovery was about 60 per cent. The unmined area consisted of 2,000 acres. The estimated life-time of the mine was 50 years. The daily capacity in 1917 was 60 tons and the daily average output 40 tons. This mine was closed down early in 1918 and will probably not be reopened.

a Not included in sample.

PENNSYLVANIA.
ALLEGHENY COUNTY.

CREIGHTON. CREIGHTON MINE.

Analyses 26932 to 26934, 26990 to 26992, and 27088 (p. 61). Bituminous coal, Beaver field, from Creighton mine, a drift mine in the Pittsburgh district, at Creighton, on the Conemaugh Division, Western Pennsylvania branch of the Pennsylvania R. R. Coal beds, Upper Freeport, or E, and Lower Freeport, or D; Carboniferous age, Allegheny formation. The two beds are practically one, being separated by a parting less than a foot thick. The thickness varies from $4\frac{1}{2}$ to $7\frac{1}{4}$ feet, averaging 5 feet; general dip, 2° north 60° west; thickness of the bone parting, 5 to 8 inches; roof, hard, smooth gray shale over thin coal; cannel coal 6 to 18 inches over thick coal; floor, hard, smooth underclay. The amount of cover over the coal varies; at some drill holes 150 to 170 feet. The bed was sampled by J. J. Rutledge on December 5, 8, and 12, 1916, as described below:

Sections of coal beds in Creighton mine.

Section..... Laboratory No.....	A. 26932	B. 26933	C. 26934	D. 26990	E. 26991
Roof, A, B, E, cannel coal; C, D, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, hard, flinty.....	1 $\frac{1}{2}$	1 7	8 $\frac{1}{2}$	10	5
Coal.....	$\frac{1}{4}$				
"Sulphur" band.....					
"Mother coal".....					$\frac{1}{2}$
Coal.....	1 4				1 3 $\frac{1}{2}$
"Mother coal".....					$\frac{1}{4}$
Coal.....					10 $\frac{1}{2}$
Bony coal.....	a 8	a 6 $\frac{1}{2}$	a 5 $\frac{1}{2}$	a 6	a 7
Coal.....		9	1 11 $\frac{1}{2}$	7	
"Mother coal".....			$\frac{1}{2}$		
Hard coal.....		4			
Shale band.....				a 1	
Coal.....	3 0	2 11 $\frac{1}{2}$	1 4	2 5	1 7
Shale band.....			a $\frac{1}{2}$	a 1	a 1
Coal.....			$\frac{1}{4}$	3 $\frac{1}{2}$	1 3
Floor, fire clay.					
Thickness of bed.....	6 $\frac{3}{4}$	6 2	4 10 $\frac{1}{2}$	4 9 $\frac{1}{2}$	6 13 $\frac{1}{2}$
Thickness of coal sampled.....	5 4 $\frac{1}{4}$	5 7 $\frac{1}{2}$	4 4 $\frac{1}{2}$	4 1 $\frac{1}{2}$	5 5 $\frac{1}{2}$

a Not included in sample.

Section A (sample 26932) was taken on the rib of 1 room, 100 feet from the chute between 10 entry and the line air course, and 5,625 feet north 48° north, 48° west, from drift mouth. Section B (sample 26933) was taken on 1 crosscut of 10 room, 15 entry, 6,750 feet north, 35° west, from drift mouth. Section C (sample 26934) was taken on rib of 5 room, 19 entry off the main, 6,000 feet north, 15° west, from drift mouth. Section D (sample 26990) was taken at face of 2 room, 150 feet from 21 entry, 7,800 feet north, 24° west, from drift mouth. Section E (sample 26991) was taken 20 feet from face of 1 room, 10 $\frac{1}{2}$ entry, 20 feet inby 1 crosscut, 3,325 feet north, 19° west, from drift mouth. A sample of cannel coal was obtained on C face, 300 feet inby old 8 right, for approximate analysis of which see laboratory No. 27088.

The results of an ultimate analysis of a composite sample made by combining samples 26932, 26933, 26934, 26990, and 26991 are given under laboratory No. 26992.

System of mining, double and triple entry, room and pillar. In 1916 cutting was done by machine and permissible explosive was used by shot firers at any time during the shift. Men numbered 135 employed underground and 25 aboveground. The coal was dumped over a tipple constructed of steel and wood. The coal was screened through bar screens 12 by 6 feet, with $1\frac{1}{2}$ -inch spaces. Sizes of coal shipped run of mine, $1\frac{1}{2}$ -inch lump, crushed coal, nut, and slack. After and before screening the coal was cleaned on pan by two pickers. There were two loading tracks, with capacity

for 43 empty and 43 loaded railroad cars. The tonnage was derived mainly from advance work. The unmined area was 1,500 acres. The estimated lifetime of the mine was 60 years. The daily capacity of the mine in 1916 was 1,400 tons, and the actual daily average 750 to 800 tons.

For description and analyses of other samples of coal from this mine see Bureau of Mines Bull. 22, pp. 154, 694.

ARMSTRONG COUNTY.

APPLEWOLD. SNYDER MINE.

Analyses 28664 to 28666 (p. 61). Bituminous coal, Allegheny Valley field, from Snyder mine, Applewold, opposite Kittanning. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, gray shale; floor, clay. The coal was sampled on June 13 and 14, 1917, by H. Bassler, as described below:

Sections of coal bed in Snyder mine.

Section.....	A.	B.
Laboratory No.....	28664	28665
Roof, gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, perhaps slightly bony.....	2	
Coal.....	11	12
Shale, carbonaceous.....		$\frac{1}{2}$
Shale binder.....		
Coal.....	2 8 $\frac{1}{2}$	2 3 $\frac{1}{2}$
Floor, clay.		
Thickness of bed.....	3 10	3 4
Thickness of coal sampled.....	3 10	3 4

Section A (sample 28664) was measured 1,200 feet southwest of mine mouth, under Shawmut R. R. tracks. Section B (sample 28665) was measured 1,125 feet northwest of mine mouth. The ultimate analysis of a composite sample made by mixing samples 28664 and 28665 is given under laboratory No. 28666.

FORD CITY. CAMPBELL MINE.

Analyses 30289 to 30292 (p. 61). Bituminous coal from Campbell mine, a drift mine in North Buffalo Township, about 1 mile southwest of Ford City, on the Pittsburgh, Shawmut & Northern R. R. Coal bed, assumed to be Upper Kittanning; Carboniferous age, Allegheny formation. Bed is 1 foot 6 inches to 2 feet 6 inches thick; dip, 1° southeast; roof, hard, gray shale; floor, hard shale. The bed lies about 50 feet above low-water level. Cover at points of sampling, 200 feet. The bed was sampled by G. S. McCaa on April 4, 1918, as described below:

Sections of coal bed in Campbell mine.

Section.....	A.	B.	C.
Laboratory No.....	30289	30290	30291
Roof, hard shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	$\frac{1}{4}$		$\frac{1}{4}$
Coal.....	3 $\frac{1}{2}$	13 $\frac{1}{4}$	4
Bone.....	$\frac{1}{4}$	$\frac{1}{4}$	
"Mother coal" and bone.....	1 $\frac{1}{2}$		1 $\frac{1}{2}$
Coal and streaks of bone.....	1 4		1 4 $\frac{1}{2}$
Coal.....		1	
Bone.....	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$
Coal.....	6 $\frac{1}{2}$	10 $\frac{1}{4}$	5 $\frac{1}{2}$
Bone.....	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
Coal.....		6 $\frac{1}{2}$	
Coal, bony.....		1 $\frac{1}{2}$	
Floor, hard shale.			
Thickness of bed.....	2 5	1 10	2 4 $\frac{1}{2}$
Thickness of coal sampled.....	2 5	1 10	2 4 $\frac{1}{2}$

Section A (sample 30289) was cut at 2 right, 50 feet from main entry. Section B (sample 30290) was cut at face of main entry, 250 feet from mouth. Section C (sample 30291) was cut at 3 right, 20 feet from main entry.

The ultimate analysis of a composite sample made by combining face samples 30289, 30290, and 30291 is given under laboratory No. 30292.

System of mining, room and pillar. In 1918 the mine was comparatively new and small. The coal was shot off the solid with FFF black powder, the only explosive used, and shots were fired at any time. Haulage was by man power. The tippie was of wood. The entire output was shipped as run of mine. The unmined area consisted of 40 acres. The estimated lifetime of the mine was 30 years. The daily capacity of the mine was about 40 tons, and the daily average production was equal to the capacity.

LOGANSPORT. RARIDAN MINE.

Analyses 28667 to 28669 (p. 61). Bituminous coal, Allegheny Valley field, from Raridan mine, Logansport P. O., at Glen station, on the Pennsylvania R. R. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof, "draw slate" 8 inches, then firm, gray shale; floor, clay. The coal was sampled on June 15, 1917, by H. Bassler, as described below:

Sections of coal bed in Raridan mine.

Section.....	A. 28667	B. 28668
Laboratory No.....		
Roof, "draw slate," gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 4	2 4
Bone and shale.....	a 1	a 1
Coal.....	8	8
Bone and shale.....	6 $\frac{1}{2}$	5 $\frac{1}{2}$
Coal.....	6	5
Floor, clay.		
Thickness of bed.....	3 7 $\frac{1}{2}$	3 6 $\frac{1}{2}$
Thickness of coal sampled.....	3 6 $\frac{1}{2}$	3 5 $\frac{1}{2}$

a Not included in sample.

Section A (sample 28667) was measured east of main mouth 1,200 feet. Section B (sample 28668) was measured at face of main entry, 3,600 feet northeast of mine mouth.

The ultimate analysis of a composite sample made by mixing samples 28667 and 28668 is given under laboratory No. 28669.

MONTGOMERYVILLE. MONTGOMERYVILLE MINE.

Analyses 28774 to 28776 (p. 61). Cannel coal, Allegheny Valley field, from Montgomeryville mine, Montgomeryville, Adrian P. O. Coal bed, Middle Kittanning; Carboniferous age, Allegheny formation. Roof, tough clay shale; floor, shale. The coal was sampled on June 21, 1917, by H. Bassler, as described below:

Section of coal bed in Montgomeryville mine.

Section.....	A. 28774	B. 28775
Laboratory No.....		
Roof, tough clay shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal (ash content may be rather high).....	a 4	
Coal.....	a 1 2	a 1 5
Pyrite streak.....		
"Sulphur" streak.....		a $\frac{1}{2}$
Coal.....	a 1 5	a 1 1
Shale.....	a 1	
Shale binder.....		a 1 $\frac{1}{2}$
Coal.....	a 4	a 5
Coal, cannel.....	1 0	11
Floor, shale.		
Thickness of bed.....	4 4	4 0
Thickness of coal sampled.....	1 0	11

a Not included in sample.

Section A (sample 28774) was measured in 6 room, left entry, 250 feet from mine mouth. Section B (sample 28775) was measured in 2 left entry, face of crossover cut. The ultimate analysis of a composite sample made by combining samples 28774 and 28775 is given under laboratory No. 28776.

WEST KITTANNING. NEAL'S MINE.

Analyses 28721 to 28723 (p. 62). Bituminous coal, Allegheny Valley field, from Neal's mine, 1 mile north of West Kittanning. Coal bed, Lower Freeport; Carboniferous age, Allegheny formation. Roof, gray shale; floor, clay shale. The coal was sampled on June 14, 1917, by H. Bassler, as described below:

Sections of coal bed in Neal's mine.

Section.....	A. 28721	B. 28722
Laboratory No.....		
Roof, gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 2½	4 8
Bone.....		
Coal.....	1 1½	
Bone.....		
Coal.....	3	
Floor, clay shale.		
Thickness of bed.....	3 8	4 8
Thickness of coal sampled.....	3 8	4 8

Section A (sample 28721) was measured 330 feet from mine mouth, at end of right entry, which branches off main entry 240 feet from mouth. Section B (sample 28722) was measured at end of main entry, 330 feet from mine mouth at entry north 60° west. The ultimate analysis of a composite sample made by mixing samples 28721 and 28722 is given under laboratory No. 28723.

YATESBORO. COWANSHANNOC No. 2 MINE.

Analyses 28672 to 28674 (p. 62). Bituminous coal, Allegheny Valley field, from No. 2 Cowanshannoc mine. Coal bed, Lower Freeport; Carboniferous age, Allegheny formation. Roof, shale; floor, clay. The coal was sampled on June 16, 1917, by H. Bassler, as described below:

Sections of coal bed in No. 2 Cowanshannoc mine.

Section.....	A. 28672	B. 28673
Laboratory No.....		
Roof, gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	^a 5	
Coal.....	4 2½	4 5
Floor, clay.		
Thickness of bed.....	4 7½	4 5
Thickness of coal sampled.....	4 2½	4 5

^a Not included in sample.

Section A (sample 28672) was measured at face of 1 left entry, 2,000 feet southwest of mouth of mine that opens out of upper bed. Section B (sample 28673) was measured at face of 1 right entry, 2,000 feet south-southwest of mouth of mine in the upper bed. Depth of cover, 125 feet. The ultimate analysis of a composite sample made by mixing samples 28672 and 28673 is given under laboratory No. 28674.

BEAVER COUNTY.

SMITHS FERRY. ISLAND RUN MINE.

Analysis 25587 (p. 62). Bituminous coal, Beaver field, from Island Run mine, 2 miles north of Smiths Ferry, on Little Beaver. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof, bituminous shale $3\frac{1}{2}$ inches, irregular bedded, massive sandstone; floor, clay. The bed was sampled on July 17, 1916, by J. H. Hance, as described below:

Section of coal bed in Island Run mine.

	Ft.	in.
Roof, bituminous shale and sandstone.		
Shale, black, coaly ^a		$3\frac{1}{2}$
Coal.....	3	3
"Mother coal" ^a		$\frac{1}{2}$
Coal.....		$4\frac{1}{2}$
Shale, black, coaly ^a		2
Floor, clay 4 feet 18 inches.		
Thickness of bed.....	4	$1\frac{1}{2}$
Thickness of coal sampled.....	3	$7\frac{1}{2}$

The section was measured $\frac{2}{3}$ mile east of main entry.

BLAIR COUNTY.

GLEN WHITE. GLEN WHITE NO. 2 MINE.

Analyses 30830 to 30832 and composite 30833, face samples, and analysis 30834, tipple sample (p. 62.) Bituminous coal from Glen White No. 2 mine, a slope mine about 3 miles west of Kittanning Point and 1 mile from Glen White, Pa., on the Pennsylvania R. R. Coal bed, Upper Freeport, known in this field as the E or Lemon; Carboniferous age, Allegheny formation. Bed is 3 feet 6 inches to 4 feet 6 inches thick; dip, 5 per cent west; roof, shale, no "draw slate;" floor, hard, smooth shale. Commercial samples were taken at the tipple by B. W. Dyer on July 12, 1918. The bed was sampled by B. W. Dyer on July 12, 1918, as described below:

Sections of coal bed in Glen White No. 2 mine.

Section.....	A. 30831	B. 30830	C. 30832
Laboratory No.....			
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	^a $1\frac{1}{2}$	1	^a $5\frac{1}{2}$
Coal.....	1 $4\frac{1}{2}$	1 $8\frac{3}{4}$	$10\frac{1}{2}$
"Sulphur".....	$\frac{1}{8}$	$\frac{1}{2}$	Streak.
Coal.....	3	1 $\frac{1}{2}$	1 8
"Sulphur".....	$\frac{1}{2}$		
Coal.....	$8\frac{1}{2}$		
Shale.....	^a 3	^a $1\frac{1}{2}$	^a $2\frac{1}{2}$
Coal.....	7	1	1 $1\frac{1}{2}$
"Sulphur".....	$1\frac{1}{8}$		
Coal.....	5		
Floor, shale.			
Thickness of bed.....	3 $9\frac{3}{16}$	4 $\frac{3}{4}$	4 4
Thickness of coal sampled.....	3 $4\frac{1}{4}$	3 $10\frac{1}{4}$	3 8

^a Not included in sample.

Section A (sample 30831) was cut from rib 40 feet inside 1 slant. 1 left. Section B (sample 30830) was cut from rib 10 feet from entry, room 65, 6 right. Section C (sample 30832) was cut from rib 70 feet from face, main slope, 6 right.

The ultimate analysis of a composite sample made by combining face samples 30831, 30830, and 30832 is given under laboratory No. 30833.

System of mining, room and pillar. The coal was cut by machine in the coal and shot down with black powder and squibs by the miners at any time during the shift. Men employed numbered 85 underground and 35 above ground. All the coal was screened at a wooden tippie; about 40 per cent passed through screens with openings $\frac{1}{2}$ inch to 4 inches; the screenings were sent to coke ovens, the oversize to railroad cars. The coal was cleaned by two pickers on the railroad cars. There was an inspector of coal at the tippie. In 1918, 65 per cent of the coal was taken out in advance work, and the total recovery claimed was 80 per cent. The unmined area consisted of 200 acres. The estimated lifetime of the mine was 10 years. Haulage was by mule and rope. There were two loading tracks, with capacity for 7 empty and 50 loaded railroad cars. The capacity of mine was 600 tons a day, and the average daily production was 450 tons. The daily tonnage was only 75 per cent of the capacity. The daily production of coke was about 95 tons, about 160 tons of coal being coked a day. The production of coal for the year 1917 was 111,180 tons.

BUTLER COUNTY.

EVANS CITY. YOUNG MINE.

Analysis 25823 (p. 63). Bituminous coal, Butler field, from Young mine, a shaft mine 6 miles north of Evans City, Connoquenessing Township, on the Baltimore & Ohio R. R. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Roof, shale; floor, fire clay. The bed was sampled on August 18, 1916, by G. B. Richardson, as described below:

Section of coal bed in Young mine.

	Ft.	in.
Roof, shale.		
Coal.....	1	11
Parting.....		<i>a</i> 1
Coal.....	1	2
Floor, fire clay.		
Thickness of bed.....	3	2
Thickness of coal sampled.....	3	1

The section was measured 200 feet northwest of shaft.

GOFF STATION. ANNANDALE NO. 2 MINE.

Analyses 26241 to 26245 (p. 63). Bituminous coal, Butler field, from Annandale No. 2 mine, a drift mine 1 mile east of Goff station, Bessemer, on the Bessemer & Lake Erie R. R. Coal bed, Brookville; Carboniferous age, Allegheny formation. Bed is 4 to 5 feet thick; dip, southeast, 40 feet to a mile, with cleat running southeast. Occasional faults, but no rolls or horsebacks, are encountered in mining. Roof, gray, sandy shale; floor, hard and smooth, of sandy clay. The bed was sampled by E. H. Denny and W. B. Plank on October 9 and 10, 1916, as described below:

a Not included in sample.

Sections of coal bed in Annandale No. 2 mine.

Section..... Laboratory No.....	A. 26241	B. 26242	C. 26244	D. 26243
Roof, sandy shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bony coal.....	<i>a</i> 2½	6		
Coal.....	1 9½	1 8	1 2	9
"Sulphur" band.....				<i>a</i> 4
Coal.....				8½
Gray slate.....	<i>a</i> 5	<i>a</i> 4	<i>a</i> 6	<i>a</i> 7
Coal.....	1 1	1 1		
Bony coal.....			<i>a</i> 2½	<i>a</i> 2½
Coal.....			5	10
"Sulphur" and coal.....	½			
"Sulphur".....		<i>a</i> 1		
Bony coal.....			<i>a</i> 1	
Coal.....			9½	
"Sulphur".....			<i>a</i> 1	
"Sulphur" and bony coal band.....				<i>a</i> ½
Coal.....	8½	1 1½	1 0	11½
Floor, fire clay.				
Thickness of bed.....	4 3	4 9½	4 3	4 1¾
Thickness of coal sampled.....	3 7½	4 4½	3 4½	3 3

a Not included in sample.

Section A (sample 26241) was taken from face of 2 main entry. Section B (sample 26242) was taken from face of 3 room, 2 main, 150 feet from entry. Section C (sample 26244) was taken from face of 3 room, 3 right entry, 1 section. Section D (sample 26243) was taken from face of 5 left entry, about 20 feet in by 14 room, 39 section.

The ultimate analysis of a composite sample made by combining face samples 26241, 26242, 26243, and 26244 is given under laboratory No. 26245.

System of mining, room and pillar. In 1916 the coal was undercut by machine and shot down with black powder by the miners at any time during the shift. Men employed numbered 65 underground and 12 aboveground. Haulage was by one electric locomotive and mules. The tipple was of wood. The entire output was shipped as run of mine. There were two loading tracks, with capacity for 35 empty and 35 loaded railroad cars. The coal was picked on the car by two pickers. The tonnage came from advance work, no pillars being drawn. The unmined area consisted of 150 acres. The lifetime of the mine was approximately 10 years. The daily capacity in 1916 was estimated at 800 tons, the actual daily average being 350 tons.

HARMONY JUNCTION. NORTH PITTSBURGH REALTY MINE.

Analysis 25615 (p. 63). Bituminous coal, Beaver field, from North Pittsburgh Realty mine at Harmony Junction, on the Baltimore & Ohio R. R. Coal bed, Middle Kittanning; Carboniferous age, Allegheny formation. Roof, shale; floor, fire clay. The bed was sampled on June 30, 1916, by G. B. Richardson. The sample represented 2 feet 9 inches of coal, the entire thickness of the bed except for 1 inch of shale at the middle, which was not included.

The section was measured in room 3, off second entry.

NEALEY. NEALEY MINE.

Analysis 25822 (p. 63). Bituminous coal, Beaver field, from Nealey drift mine at Nealey, Worth Township, on the Western Allegheny R. R. Coal bed, Middle Kittanning; Carboniferous age, Allegheny formation. Roof, shale; floor, clay. The bed was sampled on August 18, 1916, by G. B. Richardson. The sample represented 2 feet 6 inches of coal, the thickness of the bed except a 1-inch "parting" 7 inches below the roof. The section was measured in main heading 700 feet north of mine mouth.

CAMBRIA COUNTY.

BAKERTON. STERLING No. 1 MINE.

Analyses 69680 to 69682, average of mine-face samples, and analyses 69982 and 69983, average of tipples run-of-mine coal (p. 64). Semibituminous coal, Windber field, from Sterling No. 1 mine, a drift mine $\frac{1}{2}$ mile east of Bakerton, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known in this field as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet to 4 feet 6 inches thick; dip, 4 per cent west; roof, shale, with small amount of "draw slate" and 1 foot of bone; floor, hard, smooth shale. Tipple samples were taken by J. J. Bourquin on August 23, 1918. The bed was sampled by B. W. Dyer on July 2, 1918, as described below:

Section of coal bed in Sterling No. 1 mine.

Section.....	A.	B.	C.
Laboratory No.....	69680	69681	69682
Roof, shale and "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	^a 1 0	^a 8	^a 11
Coal.....	^a 0 7	5 $\frac{1}{2}$	1 5
Bone.....	1	1	
"Sulphur".....			2 $\frac{1}{2}$
Coal.....	1 0	1 1	1 0
"Sulphur".....	$\frac{1}{2}$	$\frac{1}{4}$	
Coal.....	10 $\frac{1}{2}$	1 4	
Bone.....	1		1
Coal.....	8		6 $\frac{1}{2}$
Floor, shale.			
Thickness of bed.....	4 3 $\frac{1}{2}$	3 7 $\frac{1}{4}$	3 11 $\frac{2}{5}$
Thickness of coal sampled.....	3 3 $\frac{1}{2}$	2 11 $\frac{1}{4}$	3 $\frac{1}{5}$

^a Not included in sample.

Section A (sample 69680) was taken from room 1, inside 3 cross, 7 left, 3 dip. Section B (sample 69681) was taken from 3 pillar, Gypsy crossheading, 2 dip. Section C (sample 69682) was taken from face of 4 dip, main.

System of mining, room and pillar. In 1918 the coal was cut partly by machine and partly by hand and shot down with black powder and by dynamite, where the coal was wet, at any time during the shift. Sixty per cent of the coal was taken out in advance work, and the total recovery claimed was 80 per cent. The unmined area consisted of 800 acres. The probable lifetime of the mine was 25 years. Haulage was by four electric locomotives. There was one loading track, with capacity for 40 empty and 40 loaded loaded railroad cars. Men employed numbered 65 underground and 22 aboveground. The coal was dumped over a wooden tipple, all coal being loaded and shipped as run of mine. It was cleaned on railroad cars by one picker. There was an inspector of coal at the tipple. In 1918 the coal was shipped to Pool No. 9 for domestic purposes and transportation. Prior to the war the coal was shipped to tidewater for steamship use, and was used for domestic and smithing purposes. The capacity of the mine was 800 tons a day, and the average daily output was 300 tons. The daily tonnage was only 37 $\frac{1}{2}$ per cent of the capacity of the mine, which could be increased to full capacity by additional labor.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 154, 696.

BAKERTON. STERLING No. 3 AND No. 5 MINES.

Analyses 69686 to 69688 and 69679, 69683, 69684 of Sterling No. 3 and Sterling No. 5 mines, respectively, average of mine-face samples, and analyses 69984 and 69985 average of tipples (pp. 63, 64). Semibituminous coal, Windber field, from drift mines located at Bakerton, on the Pennsylvania R. R. Coal bed, Lower Kittanning,

known in this field as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet 8 inches to 4 feet 8 inches thick; dip, 4 per cent northwest; roof, hard shale; floor, hard, rather rough shale. Commercial samples were taken at the tippie by J. J. Bourquin on August 23, 1918. The bed was sampled by J. J. Bourquin and B. W. Dyer on July 3, 1918, as shown below:

Sections of coal bed in Sterling No. 3 mine.

Section.....	A. 69687	B. 69688	C. 69686
Laboratory No.....			
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	a 1 5	a 1 4	a 1 3½
Coal.....	10½	11	1 10
"Sulphur".....	½	½	(Lens) ½
Coal.....	9¼	10¾	1 1¼
"Sulphur".....	½	¼	
Coal.....	1 2	8½	
Floor, shale.....			
Thickness of bed.....	4 3½	3 11	4 3½
Thickness of coal sampled.....	2 10½	2 7	2 11½

a Not included in sample.

Section A (sample 69687) was taken from face at Sharkey heading. Section B (sample 69688) was taken from face of 6 left. Section C (sample 69686) was taken from face of 40 room, off machine heading.

Sections of coal bed in Sterling No. 5 mine.

Section.....	A. 69683	B. 69679	C. 69684
Laboratory No.....			
Roof, shale: C, 2 in. "draw slate.".....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	a 1 1	a 1 1	a 1 4
Coal.....	7½	6½	
Bony coal.....	½		2
"Sulphur".....		¼	
Coal.....	1 2	2 1	1 2
"Sulphur".....	½		½
Coal.....	8½		1 3
"Sulphur".....	½		
Bone.....	1	1	
Coal.....	8½	7	
Floor, shale.....			
Thickness of bed.....	4 6	4 4¾	3 11½
Thickness of coal sampled.....	3 5	3 3¼	2 7½

a Not included in sample.

Section A (sample 69683) was taken from rib of 10 room, 5 left. Section B (sample 69679) was taken from main pillar, 1 left. Section C (sample 69684) was taken from face of 4 right, main off first.

System of mining, room and pillar. The coal was cut by machine and by hand in coal near the floor and shot down with black powder at any time during the shift by the miners. In 1918, 48 men were employed underground and 5 aboveground. The coal from both mines was dumped over the same wooden tippie with crossover dump, all coal being loaded and shipped as run of mine. In loading, the miner rejected bone near the roof. No pickers or inspectors were employed. At time of sampling 60 per cent of the coal was taken out in advance work, and the total recovery claimed was 85 per cent. The estimated lifetime of the mines was 5 years. Haulage was by two electric motors in each mine. There was one loading track, with capacity for 20 empty and 20 loaded railroad cars. The coal was being shipped to Pool No. 10 for use by transports. Prior to the war the coal was shipped to the United Fruit Co.

and was used also for domestic purposes and smithing. The combined capacity of the mines was 800 tons a day, and the combined average daily production at time of sampling was 500 tons. The combined daily tonnage was 62½ per cent of the capacity.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 155, 697.

BAKERTON. STERLING NO. 6 MINE.

Analyses 69685 to 69691, average of mine-face samples (p. 64). Semibituminous coal, Windber field, from Sterling No. 6 mine, a drift mine, ½ mile south of Bakerton, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known in this field as B, or Miller Carboniferous age, Allegheny formation. Bed is 3 feet to 4 feet 6 inches thick; dip, 4 per cent west; roof, hard shale; floor, hard, smooth shale. The bed was sample by J. J. Bourquin on July 2, 1918, as shown below:

Sections of coal bed in Sterling No. 6 mine.

Section.....	A.	B.	C.	D.
Laboratory No.....	69690	69691	69689	69685
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	^a 1 0	^a 1 1½	^a 1 0	^a 1 1
Coal.....	1 10½	2 5	1 9	1 10¾
"Sulphur" (not regular).....	1 1	3 3	1 9	1 10¾
Coal.....	4 3½	5 3½	1 4	1 4½
Shale.....	4 3½			
Coal.....	9			
Floor, hard shale.				
Thickness of bed.....	4 3 3/4	4 5 8/16	4 1 3/8	4 2 1/2
Thickness of coal sampled.....	3 3 3/4	2 11 1/8	3 1 3/8	3 3 1/2

^a Not included in sample.

Section A (sample 69690) was taken from face of 12 right heading, 5,000 feet from pit mouth. Section B (sample 69691) was taken from face of 2 right, off 8 left. Section C (sample 69689) was taken 25 feet from face of 17 left heading, right rib. Section D (sample 69685) was taken 10 feet from face of 4 right main, left rib.

System of mining, room and pillar. The coal was cut by machine and shot down with black powder at any time during the shift by the miners. Men employed numbered 160 underground and 21 aboveground. The coal was dumped over a wooden tipple with crossover dump, all coal being loaded and shipped as run of mine. The miners rejected 1 to 2 inches of bony coal on the top of the coal. In 1918, 60 per cent of the coal was taken out in the advance work, and a total recovery of from 80 to 85 per cent was claimed. The unmined area consisted of 2,000 acres. The probable life time of the mine was 50 years. Haulage was by three main line and three gathering electric locomotives. There was one loading track, with capacity for 60 empty and 44 loaded railroad cars. and two storage tracks. The coal was shipped to Pool No. 10 and used for transport service. Prior to the war the coal was used for domestic and smithing purposes and shipped to the United Fruit Co. The capacity of the mine was 1,200 tons a day and the average daily output at time of sampling was from 750 to 800 tons. The daily tonnage was 62½ per cent of capacity, but could be increased by the employment of additional labor.

For description and analyses of other samples of coal from this mine see Bureau of Mines Bull. 22, pp. 155, 697.

BEAVERDALE. PENNSYLVANIA NO. 15 MINE.

Analyses 69505 to 69508, average of tipple samples (p. 64). Semibituminous coal taken from tipple, Windber field, from Pennsylvania No. 15 mine, a slope mine at Beaverdale, on the South Fork branch of the Pennsylvania R. R. Coal bed,

Lower Kittanning, known in this field as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet to 3 feet 8 inches thick; dip, 7 per cent north; roof, partly shale and partly sandstone, with 8 inches of "draw slate" and bony coal; floor, hard, smooth fire clay. Commercial samples were taken at the tipple by C. L. Colburn on June 20, 1918. The bed was sampled by E. G. Borden on May 1, 1911.

System of mining, room and pillar. In 1918 the coal was cut by pick and shot down with black powder at any time during the shift by the miners. Men employed numbered 97 underground and 56 aboveground. The coal was dumped over a steel and wooden tipple equipped with screens and picking conveyor, all coal being loaded and shipped as run of mine. The coal was cleaned on a conveyor by five or six pickers, and there was an inspector at the tipple. Miners were instructed to reject bone and slate in loading. The capacity of the mine was 750 tons a day, and the average daily production at the time samples were taken at the tipple was 375 tons.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 85, pp. 71, 266.

CASSANDRA. HUGHES No. 2 MINE.

Analyses 69573 to 69575, average of mine-face samples (p. 65), and analyses 69576 to 69579, average of tipple samples (p. 65). Semibituminous coal, Windber field, from Hughes No. 2 mine, a slope mine 1 mile east of Cassandra, on the Bens Creek branch of the Pennsylvania R. R. Coal bed, Lower Kittanning, known in this field as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet to 4 feet 6 inches; dip, $8\frac{1}{2}$ per cent northwest; roof, first layer, bony coal; second layer, 6 inches "draw slate;" third layer, sandstone and shale; floor, shale, then fire clay, is smooth except at rolls. Commercial samples were taken at the tipple on June 25, 1918, by C. L. Colburn who sampled the bed the next day, as described below:

Sections of coal bed in Hughes No. 2 mine.

Section.....	A. 69573	B. 69574	C. 69575
Laboratory No.....			
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, sandstone and shale.....	5 0	2-5 0	6 0
Coal, bony.....	a 7	a 4	a 6
Coal.....	3 10	2 7	4 5
Shale.....	a 5		a 8
"Sulphur" streak.....		$\frac{3}{8}$	
Coal.....		1 0	
Carboniferous shale.....		1 0	
Coal.....	a 3	a 2	a 3
Floor, shaley fire clay.....			
Thickness of bed.....	5 1	5 $1\frac{3}{8}$	5 10
Thickness of coal sampled.....	3 10	3 7	4 5

^a Not included in sample.

Section A (sample 69573) was taken from face of C heading, $2\frac{1}{4}$ miles from entrance. Section B (sample 69574) was taken from S. 65 room, main slope. Section C (sample 69575) was taken from F heading, $2\frac{1}{2}$ miles from entrance.

System of mining, room and pillar. The coal was undercut by pick and shot down by black powder by the miners at any time during the shift. In 1918, 180 men were employed underground and 16 aboveground. Twenty-five per cent of the coal was taken out in advance work, and the total recovery claimed was 90 per cent. The coal was dumped over a wooden tipple. Ninety per cent of the coal was shipped as run of mine; the rest was screened for smithing. Haulage was by four electric locomotives, by mules, and by rope. There were three loading tracks, with capacity for 42 empty and 33 loaded railroad cars. The coal was cleaned on railroad cars by two pickers. There was an inspector of coal at the tipple. The miner rejected

bone in loading. At time of sampling 20 per cent of the coal was being shipped to commercial trade and 80 per cent to transports. Prior to the war 60 per cent of the coal was used for smithing and 40 per cent for steam. In June, 1918, the unmined area consisted of 2,800 acres, and the probable lifetime of the mine was 50 years. The daily capacity of the mine was 1,500 tons, and the average daily output was 750 tons. The daily tonnage could be increased by the employment of additional labor.

DUNLO. YELLOW RUN MINE.

Analyses 69439 to 69442, average of mine samples, and analyses 69443 to 69446, average of tippie samples (p. 65). Semibituminous coal, Windber field, from Yellow Run mine, a shaft mine, at Dunlo, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known in this field as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 to 4 feet thick; dip, 13 per cent northwest; roof, shale and sandstone; floor, hard, smooth fire clay. Commercial samples were taken at the tippie by J. J. Bourquin on June 15, 1918. The bed was sampled by J. J. Bourquin and C. L. Colburn on June 14, 1918, as described below:

Sections of coal bed in Yellow Run mine.

Section..... Laboratory No.....	A. 69439	B. 69440	C. 69441	D. 69442
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Shale.....		8 0	8 0	2-12 0
"Draw slate".....		a 2	a 2	
"Sulphur".....			a $\frac{1}{2}$	
Coal.....	3 11	3 5	3 4	3 9
Floor, fire clay.				
Thickness of bed.....	3 11	3 7	3 6 $\frac{1}{2}$	3 9
Thickness of coal sampled.....	3 11	3 5	3 4	3 9

a Not included in sample.

Section A (sample 69439) was cut at face of 36½ room, 8 right heading. Section B (sample 69440) was cut at 53 stump, 4 right heading. Section C (sample 69441) was cut at face of 8 left entry, 8,500 feet from shaft bottom. Section D (sample 69442) was cut at face of 10 right entry, 6,500 feet from shaft bottom.

System of mining, room and pillar. In 1918 the coal was undercut by pick and shot down with black powder in the evening by the miners. Men employed numbered 135 underground and 12 aboveground. The coal was dumped over a wooden tippie by means of self-dumping cages, all coal being loaded and shipped as run of mine. There was one loading track, with capacity for 28 empty and 21 loaded railroad cars. The coal was cleaned on the railroad cars by two pickers. Haulage was by one electric motor and by mules. Forty per cent of the coal was taken out in advance work, and the total recovery claimed was 95 per cent. The unmined area consisted of 500 acres. At time of sampling the coal was being shipped to the New England States, to the Bethlehem Steel Co., and to Army transports. The capacity of the mine was 1,000 tons a day, and the average daily output was 500 tons.

GALLITZIN. GALLITZIN SHAFT.

Analyses 30824 to 30827 and composite 30828, face samples, and analysis 30829, tippie samples run of mine coal (p. 65). Bituminous coal, Windber field, from Gallitzin shaft, located in Gallitzin, on the Pennsylvania R. R. Coal bed, Upper Freeport, locally known as E, or Lemon; Carboniferous age, Allegheny formation. Bed is 3 feet 6 inches to 4 feet 8 inches thick; dip, 5 per cent west; roof, rather hard shale, very little "draw slate;" floor, rather smooth shale. Commercial samples were take at the tippie by J. J. Bourquin on July 11, 1918. The bed was sampled by B. W. Dyer on July 14, 1918, as described below:

Sections of coal bed in Gallizin shaft.

Section..... Laboratory No.....	A. 30827	B. 30826	C. 30825	D. 30824
Roof, shale and bony coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	a 3	a 2 $\frac{1}{2}$	a 3	
Coal.....	11 $\frac{1}{4}$	1 6 $\frac{1}{2}$	1 4	1 7 $\frac{1}{2}$
"Sulphur".....		2 $\frac{1}{2}$	1 $\frac{1}{4}$	2 $\frac{1}{2}$
Coal.....	6 $\frac{1}{4}$	4 $\frac{3}{4}$	1 2	2 $\frac{1}{2}$
"Sulphur".....		1 $\frac{1}{2}$		1 $\frac{1}{2}$
Coal.....	5 $\frac{1}{2}$	8 $\frac{1}{2}$		1 0
"Sulphur".....				
Coal.....	10 $\frac{1}{2}$			
Shale.....	a 1	a 1 $\frac{1}{2}$	a 1 $\frac{3}{4}$	a 1
Coal, bony.....	a 1			
Coal.....	1 1	2	11	10
"Sulphur".....		1 $\frac{1}{8}$		
Coal.....		11		
Floor, shale.				
Thickness of bed.....	4 5 $\frac{1}{2}$	4 11 $\frac{3}{8}$	3 10	3 9 $\frac{5}{8}$
Thickness of coal sampled.....	4 2	3 9 $\frac{1}{2}$	3 5 $\frac{1}{4}$	3 8 $\frac{3}{8}$

a Not included in sample.

Section A (sample 30827) was cut from rib 20 feet from entry, 65 room, 9 right entry. Section B (sample 30826) was cut from rib 60 feet from entry, 5 room, 1 dip on motor road. Section C (sample 30825) was cut from rib 200 feet from entry, 55 room, 12 left entry. Section D (sample 30824) was cut from rib 70 feet from entry, 20 room, 10 right entry.

The ultimate analysis of a composite sample made by combining face samples 30824, 30825, 30826, and 30827 is given under laboratory No. 30828.

System of mining, room and pillar. In 1918 the coal was cut by machine and by pick near the bottom and shot down by the miners with black powder and squibs at any time during the shift. Men employed numbered 110 underground and 65 aboveground. The coal was dumped over a wooden tippie in a self-dumping cage. Eighty per cent of the coal passed through 4-inch bar screens and was loaded in railroad cars. The undersize was taken to coke ovens. The coal was cleaned by one picker on railroad cars and by two pickers in chutes. There was an inspector at the tippie.

Sixty-six per cent of the coal was taken out in the advance work, and a total recovery of 80 per cent was claimed. The unmined area consisted of 700 acres. The estimated lifetime of the mine was 17 years. Haulage was by one electric motor and by rope and mules. There were three loading tracks, with capacity for 25 empty and 20 loaded railroad cars. The capacity of the mine was 1,000 tons a day, and the average daily output was 550 tons. The daily tonnage was 55 per cent of the capacity, but could have been increased by the employment of additional labor. The daily production of coke was 270 tons from 450 tons of coal. The output of coal for the year 1917 was 179,844 tons.

LILLY. SONMAN No. 2 MINE.

Analyses 69599 to 69601, average of tippie samples run-of-mine coal (p. 65). Semi-bituminous coal, Windber field, from Sonman No. 2 mine, a slope mine 1 mile east of Lilly, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known in this field as B, or Miller; Carboniferous age, Allegheny formation. Bed is 38 to 46 inches thick; dip, 7 per cent northwest; roof, good shale, no "draw slate;" floor, hard, smooth fire clay. Commercial samples were taken at the tippie by B. W. Dyer on June 26, 1918. The bed was sampled by A. J. Hazelwood on April 22, 1910.

System of mining, room and pillar. In 1918 the cutting was made in the bottom and in the coal by hand and shot down with black powder and squibs by the miners at any time during the shift. Men employed numbered 85 underground and 17 above ground.

Sixty per cent of the coal was taken out in advance work, and a total recovery of 85 per cent was claimed. The unmined area consisted of 750 acres. The estimated lifetime of the mine was 20 years. Haulage was by rope and mules. There were three loading tracks, with capacity for 30 empty and 35 loaded railroad cars. The coal was dumped over a wooden tippie and was loaded and shipped as run of mine. There were no impurities in the coal as loaded on the railroad cars. The blacksmithing coal was being shipped west and the steam coal east. Before the war the coal was used by blacksmiths and for steam making. The capacity of the mine was 600 tons a day, and the average daily output was 350 tons. The output for the year 1917 was 120,000 tons.

For description of coal bed and analyses of other samples, see Bureau of Mines Bull. 22, pp. 158, 707.

LLANFAIR. HENRIETTE No. 2 MINE.

Analyses 69435 and 69438, average of tippie samples (p. 66). Semibituminous coal, Windber field, from Henriette No. 2 mine, a shaft mine 1 mile south of Llanfair, on the South Fork branch of the Pennsylvania R. R. Coal bed, Lower Kittanning, known in this field as B, or Miller; Carboniferous age, Allegheny formation. Bed is 39 to 42 inches thick; dip, 7 per cent to 10 per cent northwest; roof, shale, very little "draw slate;" floor, smooth and, after being exposed, soft fire clay. Commercial samples were taken at the tippie by C. L. Colburn on June 12, 1918. The bed was sampled by A. H. Fay on June 27, 1912.

System of mining, room and pillar. The coal was cut by pick and shot down with permissibles and black powder by the miners at the end of the day. Men employed numbered 150 underground and 15 aboveground. Fifty per cent of the coal was taken out in advance work, and a total recovery of 92 per cent was claimed. The unmined area consisted of 213 acres. The estimated lifetime of the mine was 7 years. Haulage was by two electric locomotives, rope, and mules. There were two loading tracks, with capacity for 35 empty and 60 loaded railroad cars. The coal was dumped over a wooden tippie, all coal being loaded and shipped as run of mine. The coal was cleaned on railroad cars by one picker. There was an inspector of coal at the tippie. The miner rejected very little except slate in loading. The coal was being shipped to points without the State at the rate of 500 tons a day. Prior to the war the coal was used for custom trade only. The capacity of the mine was 1,000 tons a day, and the average daily output in 1918 was 500 tons. The output for the year 1917 was 132,620 tons.

NANTY GLO. CARDIFF No. 1 MINE.

Analyses 69696 to 69699, average of mine-face samples, and analyses 69931 to 69933, average of tippie samples run of mine coal (p. 66). Semibituminous coal, Windber field, from Cardiff No. 1 mine, a drift mine $2\frac{2}{10}$ miles north of Nanty Glo, on the Coal Pit Run branch of the Pennsylvania R. R. Coal bed, Lower Kittanning, known as B, or Miller; Carboniferous age, Allegheny formation. Bed is $3\frac{1}{2}$ to 4 feet thick; dip, 2 per cent south; roof, about 6 feet of hard, gray shale, above shale sandstone, very little "draw slate;" floor, smooth, hard fire clay. Commercial samples were taken at the tippie by J. J. Bourquin on August 20, 1918. The bed was sampled by C. L. Colburn on July 1, 1918, as shown below:

Sections of coal bed in Cardiff No. 1 mine.

Section..... Laboratory No.....	A. 69699	B. 69696	C. 69698	D. 69697
Roof, main, sandstone; immediate, shale. "Draw slate".....	<i>Ft. in.</i> ^a 6	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 8	3 7	3 6	3 6
Floor, fire clay. Thickness of bed.....	4 2	3 7	3 6	3 6
Thickness of coal sampled.....	3 8	3 7	3 6	3 6

^a Not included in sample.

Section A (sample 69699) was cut at face of 21 left entry, main entrance. Section B (sample 69696) was cut at face of 4 room, 12 right, main heading. Section C (sample 69698) was cut at face of 3 left entry, main heading. Section D (sample 69697) was cut at face of 11 left entry, 14 room, main entrance.

System of mining, room and pillar. In 1918 the coal was cut by machine and shot down by the miners with permissibles at any time during the shift. Men employed numbered 120 underground and 25 aboveground. The coal was dumped over a wooden tipple, all being loaded and shipped as run of mine; it was cleaned on railroad cars by two pickers. The miner rejected "sulphur" in loading. Fifty per cent of the coal was taken out in the advance work, and the total recovery claimed was 95 per cent. The unmined area was 1,000 acres. The probable lifetime of the mine was 25 or 30 years. Haulage was by four electric locomotives. There was one loading track, with capacity for 27 empty and 24 loaded railroad cars. At the time of sampling, the coal was being shipped to transports and to the trade for steam purposes. The capacity of the mine was 800 tons a day, and the average daily output was 600 tons. The output for the year 1917 was 127,000 tons.

For analyses of other samples of this coal see Bull. 22, Bureau of Mines, p. 159.

NANTY GLO. SPRINGFIELD NO. 1 MINE.

Analyses 69612, 69614, 69616, and 69618, average of mine-face samples, and analyses 69923 to 69926, average of tipple samples run-of-mine coal (p. 66). Semibituminous coal, Windber field, from Springfield No. 1 mine, a slope mine 1 mile east of Nanty Glo, on the New York Central and Pennsylvania Railroads. Coal bed, Lower Kittanning, known as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3½ to 4 feet thick; dip, 4 per cent northeast; roof, shale, from 2 to 5 feet thick, then sandstone; floor, hard, smooth fire clay. Commercial samples were taken at the tipple on August 19, 1918, by J. J. Bourquin and L. D. Tracy. The bed was sampled by C. L. Colburn on June 28, 1918, as shown below:

Sections of coal bed in Springfield No. 1 mine.

Section..... Laboratory No.....	A. 69612	B. 69614	C. 69616	D. 69618
Roof, main, sandstone; immediate, slate.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 6	^{3 8} Little } sulphur.	3 7	3 7
Shale.....	^a 5	^a 6	^a 6	^a 6
Bottom coal.....	^a 3	^a 2	^a 2	^a 2
Floor, fire clay. Thickness of bed.....	4 2	4 4	4 3	4 3
Thickness of coal sampled.....	3 6	3 8	3 7	3 7

^a Not included in sample.

Section A (sample 69612) was taken from face 7 left, $\frac{3}{4}$ mile from entrance. Section B (sample 69614) was taken from face in main dip, 1 mile from entrance. Section C (sample 69616) was taken from face in main heading, $1\frac{1}{4}$ miles from entrance. Section D (sample 69618) was taken from pillar 1 room, 4 heading.

System of mining, room and pillar. The coal was undercut by machine or pick in coal and shot down with permissible explosive and with black powder, where there was no gas, at any time during the shift by the miners. About 66 $\frac{2}{3}$ per cent was taken out in advance work, and a total recovery of 95 per cent was claimed. The unmined area consisted of about 1,500 acres. The estimated lifetime of the mine was 30 years. Haulage was by six electric locomotives and by rope. There was one loading track, with capacity for 40 empty and 20 loaded railroad cars. Men employed numbered 175 underground and 15 aboveground. The coal was dumped over a wooden tipple, all being loaded and shipped as run of mine; it was cleaned on railroad cars by one picker. In loading the miner rejected slate. The capacity of the mine was 1,200 tons a day, and the average daily output in June, 1918, was 700 tons.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 85, pp. 78, 276, and Bull. 123, pp. 75, 292.

NANTY GLO. SPRINGFIELD NO. 3 MINE.

Analyses 69625 and 69626, average of mine-face samples, and analyses 69927 to 69930, average of tipple samples (p. 67). Semibituminous coal, Windber field, from Springfield No. 3 mine, a drift mine $\frac{1}{2}$ mile east of Nanty Glo, on the New York Central and the Pennsylvania Railroads. Coal bed, Lower Kittanning, known as B, or Miller; Carboniferous age, Allegheny formation. Bed is $3\frac{1}{2}$ to 4 feet thick; dip, 4 per cent northeast; roof, main, sandstone; immediate, shale, 2 to 5 feet thick; floor, fire clay. Tipple samples were taken by L. D. Tracy on August 20, 1918. The bed was sampled by C. L. Colburn on June 30, 1918, as shown below:

Sections of coal bed in Springfield No. 3 mine.

Section.....	A. 69625	B. 69626
Laboratory No.....		
Roof, main, sandstone; immediate, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 0	3 6
Shale.....	a 6	a 6
Bottom coal.....	a 2 $\frac{1}{2}$	a 2
Floor, fire clay.		
Thickness of bed.....	3 8 $\frac{1}{2}$	4 2
Thickness of coal sampled.....	3 0	3 6

a Not included in sample.

Section A (sample 69625) was taken from main B heading, 1 mile from entrance. Section B (sample 69626) was taken from face C main heading, $1\frac{1}{4}$ miles from entrance.

System of mining, room and pillar. In 1918 the coal was cut by machine and by pick and shot down with black powder at any time during the shift by the miners. About 66 $\frac{2}{3}$ per cent of the coal was taken out in advance work, and a total recovery of 95 per cent was claimed. Haulage was by five electric locomotives. There were two loading tracks, with capacity for 40 empty and 30 loaded railroad cars. Men employed numbered 125 underground and 15 aboveground. The coal was dumped over a wooden tipple, all being loaded and shipped as run of mine; it was cleaned on railroad cars by one picker. The miner rejected slate in loading. The section of coal mined was practically free of impurities except "sulphur"; some slate was shipped with the coal. The capacity of the mine was 900 tons a day, and the average daily output was 600 tons. The daily tonnage could be increased by the employment of additional labor.

SONMAN. SONMAN SHAFT.

Analyses 69602 and 69604, average of tipple samples (p. 67). Semibituminous coal, Windber field, from Sonman shaft, 1 mile east of Portage, on the Sonman branch of the Pennsylvania R. R. Coal bed, Lower Kittanning, locally known as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet 3 inches to 4 feet 5 inches thick; dip, 9 per cent; roof, shale, with 6 inches of "draw slate;" floor, smooth, soft fire clay. Commercial samples were taken at the tipple by J. J. Bourquin on June 26, 1918. The bed was sampled by P. M. Riefkin on May 1, 1911.

System of mining, room and pillar. In 1918 the coal was undercut by pick and shot down with black powder and permissibles by the miners at any time during the shift. Men employed numbered 275 underground and 35 aboveground. The coal was dumped over a wooden tipple by a self-dumping cage, all being loaded and shipped as run of mine. In the B seam haulage was by four electric locomotives, mules, and hoist; in the E seam, also worked, haulage was by one electric locomotive, by mule, and by rope. The coal was cleaned on railroad cars by eight pickers at the shaft and six pickers at the slope. There was an inspector of coal at the tipple. The coal was unusually well picked and much "sulphur" band was removed. There were two loading tracks at the shaft and two at the slope, having a capacity for 80 empty and 97 loaded railroad cars. A total recovery of 80 per cent was claimed. There was a large territory of unmined area. The estimated lifetime of the mine was 25 years or longer. At time of sampling the capacity of the mine was 1,000 tons a day and the average daily production was about 600 tons. The coal was shipped to the Pennsylvania R. R., to the Du Pont Co., and to transports. Prior to the war it was used for commercial purposes and shipped to Philadelphia.

For description of coal bed and analyses of other samples from this mine see Bureau of Mines Bull. 85, pp. 80, 279.

SONMAN. SONMAN SLOPE.

Analyses 26398 to 26404 (p. 67). Semibituminous coal, Windber field, from Sonman, a slope mine at Sonman, in Portage Township, on the Pennsylvania R. R. Coal bed, Upper Freeport, or E; Carboniferous age, Allegheny formation. Bed is 3 feet 6 inches to 4 feet 6 inches thick; dip, 8° west. A few faults and horsebacks are encountered. Immediate roof consists of impure coal from 4 to 15 inches in thickness, with shale above; floor, hard fire clay; cover at points of sampling, approximately 150 feet. The bed was sampled by E. H. Denny on October 18, 1916, as described below:

Sections of coal bed in Sonman slope.

Section..... Laboratory No.....	A. 26398	B. 26399	C. 26400	D. 26401	E. 26402	F. 26403
Roof, main, shale; immediate, coal.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bony coal.....					<i>a</i> $\frac{1}{2}$	
Coal.....	2 2	2 4 $\frac{1}{2}$	1 9	2 6	1 9 $\frac{1}{2}$	1 4
"Mother coal" and "sulphur".....			$\frac{1}{4}$		<i>a</i> $\frac{3}{4}$	$\frac{1}{4}$
Coal.....			8		10	1 1 $\frac{1}{2}$
"Mother coal".....			<i>a</i> $\frac{3}{8}$			
Coal.....			1			
Shale parting.....	<i>a</i> 6	<i>a</i> 4 $\frac{1}{2}$	<i>a</i> 3 $\frac{1}{2}$	<i>a</i> 3 $\frac{1}{2}$	<i>a</i> 2	<i>a</i> 3 $\frac{1}{2}$
Coal.....	9	1 7	1 6	1 7	1 6 $\frac{1}{2}$	1 3
"Mother coal" and "sulphur".....	$\frac{1}{8}$					
Coal.....	5					
Floor, hard fire clay.....						
Thickness of coal bed.....	3 10 $\frac{1}{8}$	4 4	4 4 $\frac{1}{8}$	4 4 $\frac{1}{2}$	4 5 $\frac{1}{4}$	4 $\frac{1}{2}$
Thickness of coal sampled.....	3 4 $\frac{1}{8}$	3 11 $\frac{1}{2}$	4 $\frac{1}{4}$	4 1	4 2	3 8 $\frac{1}{4}$

a Not included in sample.

Section A (sample 26398) was measured near the face of 2 left entry, off the south dip and 3,500 feet south 45° west from the slope mouth. Section B (sample 26399) was measured in 3 right air course at the intersection with the south dip, about 100 feet back from the face of the south dip and 2,900 feet south 70° west from the slope mouth. Section C (sample 26409) was measured 20 feet from the face of 2 right south dip, 1,700 feet south 60° west from the slope mouth. Section D (sample 26401) was measured at the face of 13 room, 1 right, north dip, 2,800 feet north 30° east from the slope mouth. Section E (sample 26402) was measured at the face of 1 cutthrough of 4 room, 2 left, north dip, 1,450 feet north 10° east from the slope mouth. Section F (sample 26403) was measured in the north dip, 20 feet from the face and 2,100 feet north from the slope mouth.

The ultimate analysis of a composite sample made by combining face samples 26398, 26399, 26400, 26401, 26402, and 26403 is given under laboratory No. 26404.

System of mining, room and pillar. In 1916 the coal was undercut by Sullivan short-wall machines and shot down with permissible explosive. Men employed numbered 130 underground and 12 aboveground. The tippie was of wood. The entire output was shipped as run of mine. Haulage was by electric hoist, electric locomotive, and mule. There was track capacity for 65 empty and 55 loaded railroad cars. The probable lifetime of the mine was 25 years. In 1916 the daily capacity was 1,000 tons, the daily average 800 tons, and the maximum day's run 1,000 tons. In 1919 the daily capacity was increased to 1,500 tons and the daily average to about 1,350 tons.

SOUTH FORK. ARGYLE No. 1 MINE.

Analyses 69453, 69455, and 69456, average of face samples; and analyses 69903 to 69906, average of tippie samples run-of-mine coal (p. 67). Semibituminous coal, Windber field, from Argyle No. 1 mine, a drift mine at South Fork, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet to 4 feet 6 inches thick; roof, hard shale containing irregular streaks of "sulphur;" floor, fairly smooth, hard fire clay. Commercial samples were taken at the tippie by J. J. Bourquin and L. D. Tracy on August 16, 1918. The bed was sampled by J. J. Bourquin on June 10, 1919, as described below:

Sections of coal bed in Argyle No. 1 mine.

Section.....	A. 69453	B. 69455	C. 69456
Laboratory No.....			
Roof, main, sandstone; immediate, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 6	3 7	a 9
Bony coal.....			3 8½
Coal.....			
Floor, fire clay.			
Thickness of bed.....	3 6	3 7	4 5½
Thickness of coal sampled.....	3 6	3 7	3 8½

a Not included in sample.

Section A (sample 69453) was cut at 3 north entry, 6 entry, 5 feet from face. Section B (sample 69455) was cut at split in pillar between 5 and 6 north entry. Section C (sample 69456) was cut at face of main heading, 1 mile from pit mouth.

System of mining, room and pillar. In 1918 the coal was undercut by pick and shot down at any time during the shift by three shot firers with permissible explosive, which was used in shooting up the bottom. Men employed numbered 38 underground and 13 aboveground. The coal was dumped over a wooden tippie, all being loaded and shipped as run of mine. Haulage was by tail rope. There was one loading track, with capacity for 14 empty and 13 loaded railroad cars. The coal was cleaned on cars by one picker and one helper. As loaded on the railroad cars the coal showed "sul-

phur" in irregular streaks and balls. The work in the mine was confined to the removal of pillars, and a total recovery of 95 per cent was claimed. The estimated lifetime of the mine was 5 years. At time of sampling the capacity of the mine was 400 tons a day and the average daily production was 200 tons. The output for the year 1917 was 90,807 tons. About half the coal was being shipped to tidewater and half, for Government use, to Pools 9 and 10.

SOUTH FORK. ARGYLE No. 2 MINE.

Analyses 69451, 69452, and 69454, average of mine samples; and analyses 69907 to 69910, average of tipple samples run of mine coal (p. 68). Semibituminous coal, Windber field, from Argyle No. 2 mine, a drift mine in South Fork Borough, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet 6 inches to 4 feet thick; dip, up to 10° northeast; roof, hard shale, no "draw slate"; floor, hard, rather smooth fire clay. Commercial samples were taken at the tipple by J. J. Bourquin and L. D. Tracy on August 15, 1918. The bed was sampled by J. J. Bourquin on June 11, 1918, as described below:

Sections of coal bed in Argyle No. 2 mine.

Section..... Laboratory No.....	A. 69451	B. 69452	C. 69454
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	6 $\frac{3}{4}$		
"Sulphur" band.....			
Shale.....		^a 1	
Coal.....	2 6 $\frac{1}{2}$	4	1 3
"Sulphur" band.....		$\frac{1}{2}$	$\frac{1}{8}$
Coal.....	5 $\frac{3}{4}$	6	1 11
Shale.....		$\frac{1}{2}$	
Coal.....		1 8 $\frac{1}{4}$	
"Sulphur".....		$\frac{1}{4}$	$\frac{5}{8}$
Coal.....		1 0	9
Floor, fire clay.			
Thickness of bed.....	3 7 $\frac{7}{8}$	3 8 $\frac{3}{4}$	3 11 $\frac{3}{4}$
Thickness of coal sampled.....	3 7 $\frac{7}{8}$	3 7 $\frac{3}{4}$	3 11 $\frac{3}{4}$

^a Not included in sample.

Section A (sample 69451) was cut 10 feet from face of 10 room, 7 right entry. Section B (sample 69452) was cut at face of 6 room, chain pillar, 5 left entry. Section C (sample 69454) was cut from 2 right entry, 9 entry, No. 1 rib.

System of mining, room and pillar. In 1918 the coal was undercut by pick and shot down with black powder and with permissible explosive in the safety-lamp sections, at any time during the shift, by miners and by shot firers. Men employed numbered 57 underground and 23 aboveground. The coal was dumped over a wooden tipple, all being loaded and shipped as run of mine. Haulage was by tail rope. There was one loading truck, with capacity for 12 empty and 14 loaded railroad cars. The coal was cleaned on railroad cars by one picker. The coal on the cars contained some material from roof and partings in seam, particularly "sulphur" bands. Sixty per cent of the coal was taken out in advance work, and a total recovery of 95 per cent was claimed. The estimated lifetime of the mine was 10 years. The capacity of the mine was 700 tons a day, and the average daily output at time of sampling was 450 tons. The output for the year 1917 was 137,934 tons.

SOUTH FORK. STINEMAN No. 2 MINE.

Analyses 69391, 69394, to 69396, average of tipple samples, run of mine coal (p. 68). Semibituminous coal, Windber field, from Stineman No. 2 mine, a drift mine $\frac{3}{4}$ mile west of South Fork, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known as

B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet 8 inches to 4 feet 6 inches thick; dip, $7\frac{1}{2}^{\circ}$ northwest; roof, shale, no "draw slate"; floor, smooth, shale and bottom coal. Commercial samples were taken at the tippie by J. J. Bourquin and C. L. Colburn on June 8, 1918. The bed was sampled by H. M. Wolflin, on September 7, 1909.

System of mining, room and pillar. In 1918 the coal was undercut with black powder, a little permissible explosive being used for rock, at any time during the shift, by the miners. Men employed numbered 135 underground and 15 aboveground. The coal was dumped over a wooden tippie, all being loaded and shipped as run of mine. The coal was cleaned on railroad cars by one picker. Haulage was by animal and by three electric locomotives. There was one loading track, with capacity for 20 empty and 20 loaded railroad cars. The unmined area consisted of approximately 400 acres. At time of sampling 60 per cent of the coal was taken out in the advance work, and the recovery claimed was 90 per cent. The estimated lifetime of the mine was from 15 to 20 years. The coal was shipped to the Du Pont Co., at Carneys Point, N. J. The capacity of the mine was 700 tons a day, and the average daily output at the time tippie samples were taken was 550 tons.

For description of coal bed and analyses of other samples see Bureau of Mines Bull. 22, pp. 161, 716.

SOUTH FORK. STINEMAN NO. 4 MINE.

Analyses 69447 to 69450, average of tippie samples, run of mine coal (p. 68). Semi-bituminous coal, Windber field, from Stineman No. 4 mine, a slope mine $\frac{1}{2}$ mile from South Fork, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known as B, or Miller; Carboniferous age, Allegheny formation. Bed is $2\frac{1}{2}$ to $4\frac{1}{2}$ feet thick; dip, 12° south 60° west; roof, gray shale, about 6 inches of which comes down as a "draw slate"; floor, hard, shaly clay, with a smooth surface. Commercial samples were taken at the tippie by J. J. Bourquin and C. L. Colburn on June 8, 1918. The bed was sampled by H. M. Wolflin on September 2 and 9, 1909.

System of mining, room and pillar. In 1918 the coal was undercut by hand and shot down with black powder at any time during the shift by the miners. Men employed numbered 120 underground and 20 aboveground. The coal was dumped over a wooden tippie, all being loaded and shipped as run of mine; it was cleaned on the railroad cars by one picker. Haulage was by mule and by rope. There was one loading track, with capacity for 30 empty and many loaded railroad cars. The capacity of the mine at time of sampling was 500 tons a day, and the average daily output was 400 tons. The output for the year 1917 was 125,740 tons. The unmined area included 575 acres.

For description of coal bed and analyses of samples see Bureau of Mines Bull. 22, pp. 161, 717.

ST. MICHAEL. MARYLAND SHAFT MINE.

Analyses 25717 to 25722, 68185, 68187, 68193, 68219, 68220, 30152, and tippie sample 30153 (p. 68). Semibituminous coal, Windber field, from Maryland shaft mine $\frac{1}{2}$ mile west of St. Michael, on the Pennsylvania R. R. Coal bed, Lower Kittanning, Miller, or B; Carboniferous age, Allegheny formation. Average thickness of bed, 3 feet 9 inches; dip, 6 per cent northeast; slight cleat; no faults. Rolls or horsebacks are rather frequent. In places roof consists of 6 inches of "draw slate," which comes down with the coal; the immediate roof falls in rooms, but not when mined. Floor, medium hard, rolling fire clay. Depth of shaft, 670 feet. The bed was sampled by E. H. Denny and R. H. Seip on July 27 and 28, 1916, as described below:

Sections of coal bed in Maryland shaft mine, sampled in 1916.

Section..... Laboratory No.....	A. 25717	B. 25718	C. 25719	D. 25720	E. 25722
Roof, sandstone.	<i>Ft. in.</i> <i>a</i> 5½	<i>Ft. in.</i> <i>a</i> 5	<i>Ft. in.</i> <i>a</i> 6½	<i>Ft. in.</i> <i>a</i> 4	<i>Ft. in.</i> <i>b</i> 5
Coal, bony and "sulphury".....					
Bone.....					
Coal.....	3 2½	3 4	3 1	3 6	2 4½
Floor, fire clay.					
Thickness of bed.....	3 8	3 9	3 7½	3 10	2 10
Thickness of coal sampled.....	3 2½	3 4	3 1	3 6	2 10

a Not included in sample.*b* Five inches of top coal appeared to be good, and being low coal all of section was included in pillar sample.

Section A (sample 25717) was cut from the face of 7 left main entry. Section B (sample 25718) was cut from the face of 2 longwall. Section C (sample 25719) was cut from 2 left entry, south main entry, 15 feet from the face. Section D (sample 25720) was cut from the face of 7 left entry, south main entry. Section E (sample 25722) was cut from 19 pillar, 6 right north entry.

The ultimate analysis of a composite sample made by combining samples 25717, 25718, 25719, and 25720 is given under laboratory No. 25721. Commercial samples were taken at the tipple by E. T. Hancock on December 28, 1917. The bed was sampled by E. Stebinger on December 28, 1917, as described below:

Sections of coal bed in Maryland shaft mine, sampled in 1917.

Section..... Laboratory No.....	A. 68220	B. 68187	C. 68193	D. 68219	E. 68185
Roof, bony coal and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, "sulphurous".....					<i>a</i> 6
Bony and "sulphurous" coal.....	<i>a</i> 4	<i>a</i> 4	<i>a</i> 2	<i>a</i> 2	3
Coal, fairly hard.....	1 0				
Coal, "dirty," bony, "sulphurous".....		2	2	2	2
Coal, hard, dull.....		1 0	1 4		
Coal, soft and friable.....	1 11	2 5	1 8	3 7	2 10
Floor, fire clay.					
Total thickness of bed.....	3 3	3 11	3 4	3 11	3 9
Thickness of coal sampled.....	2 11	3 7	3 2	3 9	3 3

a Not included in sample.

Section A (sample 68220) was cut at face of south main. Section B (sample 68187) was cut at face of C heading on longwall. Section C (sample 68193) was cut on 6 longwall face. Section D (sample 68219) was cut at face of 2 right, 3 right. Section E (sample 68185) was cut at face of 3 right dip.

The ultimate analysis of a composite sample made by combining face samples 68220, 68187, 68193, 68219, and 68185 is given under laboratory No. 30152.

The ultimate analysis of a composite sample made by combining tipple samples of run of mine coal, 68201, 68202, 68210, and 68212, is given under laboratory No. 30153.

Systems of mining, longwall and room and pillar. Men employed numbered 325 underground. Mine had a steel tipple. Miners' electric lamps were used in pillar workings, carbide lamps in rooms and headings. There were no coal-cutting machines. Haulage was by electric motors. About half the coal was taken out in advance work, and the total recovery claimed was 85 per cent. The unmined area consisted of approximately 3,500 acres. The estimated lifetime of the mine was from 50 to 60 years. The coal was all shipped as run of mine; no screens were used. Three pickers were employed on the railroad cars. There were two loading tracks, with capacity for 50 empty and 40 loaded railroad cars. At time of sampling the capacity of the mine was 1,200 tons a day, and the maximum day's run was 1,900 tons. The output was to be increased to 3,000 tons a day.

VINTONDALE. VINTON No. 1 MINE.

Analyses 69729, 69730, 69733, and 69734, average of mine-face samples, and analyses 70030 to 70033, average of tippie samples (p. 69). Semibituminous coal, Windber field, from Vinton No. 1 mine, $\frac{1}{2}$ mile northwest of Vintondale, on the Pennsylvania R. R. Coal bed, Lower Kittanning, locally known as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet 4 inches to 4 feet thick; dip, $3\frac{1}{2}$ per cent northwest; roof, shale; floor, hard, smooth shale. Commercial samples were taken at the tippie by L. D. Tracy on August 28, 1918. The bed was sampled by J. J. Bourquin on July 9, 1918, as shown below:

Sections of coal bed in Vinton No. 1 mine.

Section..... Laboratory No.....	A. 69729	B. 69734	C. 69730	D. 69733
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	11 $\frac{1}{2}$	3 6 $\frac{1}{2}$	3 10	3 8 $\frac{1}{2}$
Bony coal.....	2 7 $\frac{3}{4}$			
Coal.....				
Shale; in sections C and D "sulphur?" streaks.....		1		
Floor, shale and coal.				
Thickness of bed.....	3 7 $\frac{3}{4}$	3 7 $\frac{1}{2}$	3 10	3 8 $\frac{1}{2}$
Thickness of coal sampled.....	3 7 $\frac{3}{4}$	3 6 $\frac{1}{2}$	3 10	3 8 $\frac{1}{2}$

^a Not included in sample.

Section A (sample 69729) was taken from left rib 8 room, 1 left, 3 section, 10 feet from face. Section B (sample 69734) was taken from face of 9 room, 8 left, 2 section. Section C (sample 69730) was taken from face of 7 left, 5 butt, 2 section. Section D (sample 69733) was taken from 1 breakthrough, 34 room, 9 left, 1 section.

System of mining, room and pillar. In 1918 the coal was cut by machine and shot down with permissible explosive, at any time during the shift, by the miners. Men employed numbered 200 underground and 20 aboveground. About 65 per cent of the coal was taken out in advance work, and a total recovery of 85 per cent was claimed. The unmined area was 700 acres. The estimated lifetime of the mine was 20 years. Haulage was by seven electric locomotives. There were two loading tracks with capacity for 35 empty and 35 loaded railroad cars. The coal was dumped over a steel tippie with crossover dump, all coal being loaded and shipped as run of mine. The coal was cleaned on picking tables by four pickers. There was an inspector of coal at the tippie. At time of sampling, the capacity of the mine was 1,200 tons a day, and the average daily output in June, 1916, was 900 tons. The output for the year 1917 was 250,000 tons. The daily tonnage was 75 per cent of the capacity of the mine.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 162, 721.

VINTONDALE. VINTON No. 6 MINE.

Analyses 69731 and 69735 to 69738, average of mine-face samples (p. 69). Semibituminous coal, Windber field, from Vinton No. 6, a drift mine at Vintondale, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known locally as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 to 4 feet thick; dip, 3 per cent northwest; roof, good shale; floor, smooth, rather soft fire clay, above which is shale and bony coal. The bed was sampled by B. W. Dyer on July 9, 1918, as shown below:

Section of coal bed in Vinton No. 6.

Section.....	A.	B.	C.	D.	E.
Laboratory No.....	69736	69735	69738	69737	69731
Roof, shale.....	<i>Fl. in.</i>	<i>Fl. in.</i>	<i>Fl. in.</i>	<i>Fl. in.</i>	<i>Fl. in.</i>
Coal, bony.....	$\frac{1}{2}$				$\frac{1}{2}$
Coal.....	2	$5\frac{1}{2}$	$6\frac{1}{2}$	1	2 7
"Sulphur".....	$1\frac{1}{6}$	$1\frac{1}{6}$	$1\frac{1}{6}$	$1\frac{1}{6}$	$1\frac{1}{6}$
Coal.....	1 $1\frac{1}{2}$	1 $8\frac{1}{2}$	1 10	5	8
Coal, bony.....	$1\frac{1}{2}$				
Coal.....	10				
"Sulphur".....	$3\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{1}{4}$	2 10	
Coal.....	$3\frac{1}{2}$	$8\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{1}{2}$	
"Sulphur".....	$11\frac{1}{2}$	$4\frac{1}{4}$			
Coal.....		$6\frac{1}{2}$	1		
Coal, bony.....			9		
Floor, shale and bony coal under fire clay.					
Thickness of bed.....	3 $7\frac{1}{8}$	3 $8\frac{1}{6}$	3 $10\frac{9}{16}$	3 $8\frac{1}{2}$	3 $4\frac{1}{4}$
Thickness of coal sampled.....	3 $7\frac{1}{5}$	3 $8\frac{1}{6}$	3 $10\frac{9}{16}$	3 $8\frac{1}{2}$	3 $4\frac{1}{4}$

Section A (sample 69736) was taken from rib, 1 right butt, 13 right, off 2 slope. Section B (sample 69735) was taken from face of 13 right, off 3 slope. Section C (sample 69738) was taken from face of 4 right main, off 15 left, 2 slope. Section D (sample 69737) was taken from 1 left, off 1 slope, rib, 10 feet from face. Section E (sample 69731) was taken from rib, 100 feet from face, 15 right, 3 slope.

System of mining, room and pillar. At time of sampling the coal was cut by machine and shot down with permissible explosive at any time during the shift by shot firers. About 65 per cent of the coal was taken out in the advance work, and a total recovery of 85 per cent was claimed. The unmined area consisted of 2,500 acres. In 1918 the probable lifetime of the mine was 45 years. Haulage was by eight electric locomotives. There were two loading tracks, with capacity for 40 empty and 40 loaded railroad cars. There were 290 men employed underground and 35 above-ground. The coal was dumped over a steel tippie with chain haul dump; about 50 per cent of the coal went through a bar screen with 3 to $1\frac{1}{4}$ inch openings, the oversize being recombined and loaded out, and the undersize being taken to washery; about one-third of the coal was loaded and shipped as run of mine. The coal was cleaned on railroad cars by three pickers. The coal as loaded on the railroad cars showed the presence of few impurities. The capacity of the mine in July, 1919, was 1,500 tons a day, and the average daily production was 1,200 tons. The output for the year 1917 was 450,000 tons. The daily tonnage was 80 per cent of the capacity. All coal passing through $\frac{1}{4}$ -inch screen was washed and coked; about 450 tons of coal a day was used for the coke oven. No washed coal was shipped.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 163, 722.

WINDBER. EUREKA No. 40 MINE.

Analyses 68179, 68190, 68191, 68222, and 30173, and tippie samples 68204, 68206, 68207, 68208, and 30174 (p. 70). Semibituminous coal, Windber field, from Eureka No. 40 mine, a drift mine $1\frac{1}{4}$ miles northwest of Windber, in Richland township, on a spur of the Pennsylvania R. R. Coal bed, Lower Kittanning or B seam; Carboniferous age, Allegheny formation. Average thickness of bed is 4 feet 2 inches; dip, 2° southwest; no cleat; few faults. Roof consists of "draw slate," 2 to 10 feet. Floor consists of fire clay and lower coal on top of fire clay. Particles of roof and floor did not become mixed with coal in loading. Vertical height to seam, 90 feet. The bed was sampled by E. Stebinger on December 26, 1917, as described below:

Sections of coal bed in Eureka No. 40 mine.

Section..... Laboratory No.....	A. 68179	B. 68190	C. 68191	D. 68222
Roof, shale.	<i>Ft. in.</i> a 3	<i>Ft. in.</i> a 6	<i>Ft. in.</i> a 5	<i>Ft. in.</i> a 2
Coal, "sulphury".....	1		2	2
Coal, "sulphury".....				
Coal, clean.....	1 0	3 4		10½
Coal, vertical slicken faces.....			10	
Coal, bony.....	1			½
Coal, clean.....	11½			
Shale.....	0		½	
Coal, soft, friable.....	2 0		2 5	2 5½
Shale, 8 inches; "sulphury" coal, 8 inches; fireclay, 1 inch.....				a 2 4
Floor, shale.				
Thickness of bed.....	4 4½	3 10	3 10½	6 ½
Thickness of coal sampled.....	4 1½	3 4	3 5½	3 6½

a Not included in sample.

Section A (sample 68179) was cut in 25 room, left main. Section B (sample 68190) was cut in main heading, 600 feet in by 26 left. Section C (sample 68191) was cut in 4 room, main, 14 right. Section D (sample 68222) was cut in 19 right main.

The ultimate analysis of a composite sample made by combining face samples 68179, 68190, 68191, and 68222 is given under laboratory No. 30173. The ultimate analysis of a composite sample made by combining tippie samples 68204, 68206, 68207, and 68208 is given under laboratory No. 30174.

System of mining, room and pillar. In 1917 the coal was undercut by a chain and a punching machine; the haulage was by electric motor. The coal was all shipped as run of mine and was picked on car and at tippie. The coal on the cars appeared to be very clean; the lumps were mostly small. There was track capacity for 50 empty and 50 loaded railroad cars. About 50 per cent of the coal was taken out in the advance work, and a total recovery of 80 per cent was made. At time of sampling the capacity of the mine was 4,000 tons a day, and the daily average shipments were 2,000 tons.

For descriptions and analyses of other samples of coal from this mine see Bureau of Mines, Bull. 22, pp. 164, 725.

CLEARFIELD COUNTY.**MUNSON. GHEM MINE.**

Analyses 26306 to 26312 (p. 70). Bituminous coal Windber field, from Ghem mine, a slope mine, at Munson, on the Beech Creek branch of the New York Central R. R. Coal bed, Lower Kittanning, known as B, or Miller; Carboniferous age; Allegheny formation. Bed is 3 feet to 3 feet 4 inches thick and dips 4° southwest. Mining is impeded by rolls and by many faults. Roof, 14 to 16 inches of impure coal, with sandy shale above; floor, hard, firm underclay. The bed was sampled by E. H. Denny on October 14, 1916, as described below:

Sections of coal bed in Ghem mine.

Section..... Laboratory No.....	A. 26306	B. 26307	C. 26308	D. 26309
Roof, fine sandy shale.	<i>Ft. in.</i> a 1 2	<i>Ft. in.</i> a 1 2½	<i>Ft. in.</i> a 1 3½	<i>Ft. in.</i> a 1 2½
Roof coal.....	1 2½	2 2	2 ¾	2 ¾
Coal.....		a 2	¾	¾
"Sulphur" band.....	11½	1 0	1 2	1 1
Coal.....	1 1			
"Sulphur".....				
Coal.....				
Floor, fire clay.				
Thickness of bed.....	3 3¼	3 4	3 3	3 2
Thickness of coal sampled.....	3 3¼	3 2	3 3	3 2

a Not included in sample.

Section A (sample 26306) was measured at the face of 9 right heading, 3,425 feet south 75° west from the slope mouth. Section B (sample 26307) was measured 20 feet from face of 2 main and 2,275 feet north 89° west from the slope mouth. Section C (sample 26308) was measured in 2 room off 3 right back heading and 1,825 feet north 74° west from slope mouth. Section D (sample 26309) was measured 25 feet from face of 8 right heading and 3,475 feet south 75° west from slope mouth.

The ultimate analysis of a composite sample made by combining samples 26306 to 26309 is given under laboratory No. 26310. Two samples of roof coal were also taken. For the results of analyses see laboratory Nos. 26311 and 26312.

Sections of roof coal in Ghem mine.

Section.....	A.	B.
Laboratory No.....	26311	26312
	<i>Inches.</i>	<i>Inches.</i>
Coal.....	5½	4½
"Sulphur" band.....	¼	⅓
Coal.....	4	3½
Dark dull binder.....	1½	
Shale and coal.....		a 6½
Coal.....	1¾	
Shale band.....	a 1	
Total.....	13¾	15

a Not included in sample.

Section A (sample 26311) was taken from face 2 room off 3 right back heading. Section B (sample 26312) was taken 25 feet from face of 8 right.

System of mining, double and triple entry, room and pillar. At time of sampling the coal was either overcut or undercut by hand and shot down with FFFF black powder, 40 per cent dynamite being used in wet places and for blasting the rock in rolls and faults. The estimated lifetime of the mine was 15 years. In 1916 haulage was by two electric locomotives and by mule. There was one loading track, with capacity for 10 empty and 20 loaded railroad cars. The miners drilled, loaded, and shot their own holes whenever ready. Men employed numbered 64 underground and 10 aboveground. The coal was dumped over a wooden tippie, all coal being shipped as run of mine. The coal was cleaned by two pickers. The capacity of the mine in 1916 was estimated to be 400 to 500 tons a day, and the average production was 275 tons.

JEFFERSON COUNTY.

PUNXSUTAWNEY. ELEANORA MINE.

Analyses 26827 to 26832 (p. 71). Bituminous coal, Punxsutawney field, from Eleonora mine, a slope and a shaft mine 8½ miles north of Punxsutawney, accessible to a branch line of the Buffalo, Rochester & Pittsburgh R. R. Coal bed, Lower Freeport, or D; Carboniferous age; Allegheny formation. Bed is 4 to 7 feet thick and contains many minute seams of "sulphur" and bone; roof, 10 to 20 inch seam of soft shale, which makes mining difficult; there is a persistent 2 to 4 inch band of cannel coal about 3 feet from the roof, 3 inches below which lies an intermittent thin seam of bone. Floor, hard shale. Cover ranges from 200 to 350 feet. The bed was sampled by E. Steidle on November 27 to 28, 1916, as described below:

Sections of coal bed in Eleanora mine.

Section.....	A. 26827	B. 26828	C. 26829	D. 26830	E. 26831
Laboratory No.....					
Roof, soft shale.....	<i>Ft. in.</i> 2 0	<i>Ft. in.</i> 3 2	<i>Ft. in.</i> 2 10	<i>Ft. in.</i> 3 2	<i>Ft. in.</i> 1 7½
Coal.....	10				
Bone.....	3	2½	4	3	
Coal.....	6	3	3	2 0	
Bone.....	½	¼	¼	¼	
Slate.....					½
Coal.....	3 0	3	6	2 6	3
Bone.....		1½	½		½
Coal.....		2 0	2 2		3 0
Floor, shale.....					
Thickness of bed.....	6 7¾	5 11	6 1¾	6 11¼	4 11½
Thickness of coal sampled.....	6 7¾	5 11	6 1¾	6 11¼	4 11½

Section A (sample 26827) was taken from 12 left, 1,000 feet in by main slope. Section B (sample 26828) was taken from face 8 west, off 4 face entry. Section C (sample 26829) was taken from face 2 room, off 4 west butt, off 14 left. Section D (sample 26830) was taken from face 2, west butt, off 14 left. Section E (sample 26831) was taken from face of 1 left, off 12 south.

The ultimate analysis of a composite sample made by combining face samples 26827, 26828, 26829, 26830, and 26831 is given under laboratory No. 26832.

System of mining, room and pillar. In 1916 all coal was undercut with 3 chain machines and 15 punchers. Black powder was used in the nongaseous or open-light section by the miners, and permissible explosive in the gaseous or closed-light section, fired electrically by shot firers. Haulage was by eight trolley motors and by mules. The daily output in 1916 was 1,400 tons, and in 1918, 1,165 tons.

SOMERSET COUNTY.

CAIRNBROOK. LOYAL HANNA No. 6 MINE.

Analyses 69564 and 69565, average of tipple samples (p. 71). Semibituminous coal, Somerset field, from Loyal Hanna No. 6 mine, a drift mine at Cairnbrook, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known locally as B, or Miller; Carboniferous age; Allegheny formation. The coal mined is about 4 feet in height, above which is from 5 to 6 inches of bone and above that from 0 to 20 inches of coal, but no coal above the bone is mined. The bed dips 1 to 2 per cent west. Roof, shale; floor, smooth shale. Commercial samples were taken at the tipple by J. J. Bourquin on June 24, 1918. The bed was sampled on September 18, 1914, by G. B. Richardson.

System of mining, room and pillar. In 1918 the coal was cut at the top and in the bony portion by machine and shot down with black powder in the room and with permissible explosives in the entries at any time by the miners. There were 170 men employed underground and 30 aboveground. The coal was dumped over a wooden tipple, all coal from the two benches being loaded and shipped as run of mine. There was an inspector on the railroad cars. The capacity of the mine was 2,600 tons a day, and the average daily output at the time samples were taken at the tipple was 800 to 900 tons.

For description of coal bed and analyses of samples see Bureau of Mines, Bull. 123, pp. 80, 308.

CAIRNBROOK. REITZ No. 2 MINE.

Analyses 69678 and 69591 to 69594, average of mine-face samples, and analyses 69566 to 69568, average of tipple samples (p. 71). Semibituminous coal, Somerset field, from Reitz No. 2 mine, a drift mine $\frac{1}{4}$ mile west of Cairnbrook, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 to 4 feet thick and dips 2 per cent west; roof, good shale over about 5 inches of roof coal; floor, hard, smooth shale. Commercial samples were taken at the tipple by C. L. Colburn on June 22, 1918. The bed was sampled by B. W. Dyer on June 24, 1918, as described below:

Sections of coal bed in Reitz No. 2 mine.

Section..... Laboratory No.....	A. 69591	B. 69593	C. 69594	D. 69678	E. 69592
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, main, shale; immediate, bone.....	5	5	5	2	
"Draw slate".....					4
Bone.....	1	2			
Coal.....	6	4 $\frac{1}{4}$	3	4 $\frac{1}{2}$ $\frac{1}{4}$	6
Shale.....					
"Sulphur".....			$\frac{1}{4}$		
Bone.....	1				1
Coal.....	2 $\frac{1}{2}$ $\frac{1}{4}$	11 $\frac{1}{8}$	1 1 $\frac{1}{4}$	1 9 $\frac{1}{8}$	1 10 $\frac{1}{2}$ $\frac{1}{4}$
"Sulphur".....					
Coal.....	3 $\frac{1}{16}$	2 5 $\frac{1}{8}$	1 1 $\frac{1}{2}$	1 3 $\frac{1}{2}$	10 $\frac{1}{4}$
"Sulphur".....	$\frac{1}{16}$				$\frac{1}{4}$
Shale.....		$\frac{1}{4}$		$\frac{1}{2}$	
Coal.....	5 $\frac{1}{2}$ $\frac{1}{8}$	3	1 2 $\frac{1}{2}$	4	2 $\frac{1}{2}$
"Sulphur".....					
Coal.....	2 $\frac{1}{8}$				
Floor, shale.....					
Thickness of bed.....	3 7 $\frac{7}{16}$	4 1 $\frac{5}{8}$	3 8 $\frac{1}{2}$	3 9 $\frac{1}{8}$	3 6 $\frac{1}{2}$
Thickness of coal sampled.....	3 7 $\frac{7}{16}$	4 1 $\frac{5}{8}$	3 8 $\frac{1}{2}$	3 9 $\frac{1}{8}$	3 6 $\frac{1}{2}$

Section A (sample 69591) was cut at face of 28 room, 8 left entry, 10 feet from entry. Section B (sample 69593) was cut at face of main heading. Section C (sample 69594) was cut at face of 18 room, 8 right entry, 15 feet from entry. Section D (sample 69678) was cut at face of 38 room, 6 left entry, 10 feet from entry. Section E (sample 69592) was cut at face of 31 room, 6 right entry, 150 feet from entry.

System of mining, room and pillar. In 1918 the coal was cut by machine in bottom coal and shot down with black powder and squibs by the miners at any time during the shift. Men employed numbered 180 underground and 25 aboveground. The coal was dumped over a wooden tipple, all being loaded and shipped as run of mine. Three pickers were employed on the railroad cars. The coal was shipped to Pennsylvania, New York, and the New England States and used for steam and domestic purposes. At time of sampling the capacity of the mine was 1,500 tons a day, and the average daily output was 1,200 tons. The output for the year 1917 was 360,000 tons. An increase in tonnage to 2,000 tons a day was anticipated.

CAIRNBROOK. SCALP LEVEL No. 3 MINE.

Analyses 69595 to 69598, average of mine-face samples (p. 71). Semibituminous coal, Somerset field, from Scalp Level No. 3 mine, a drift mine $2\frac{1}{4}$ miles west of Cairnbrook, on the Pennsylvania R. R. Coal bed, Lower Kittanning, known as B, or Miller; Carboniferous age, Allegheny formation. Bed is 3 feet 2 inches to 3 feet 8 inches thick; dip, 3 per cent west; roof, shale, good above top coal; floor, smooth, hard fire clay. The bed was sampled by B. W. Dyer on June 25, 1918, as shown below:

Sections of coal bed in Scalp Level No. 3 mine.

Section..... Laboratory No.....	A. 69598	B. 69597	C. 69595	D. 69596
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal and bone.....	<i>a</i> 1 2	<i>a</i> 2 0	<i>a</i> 1 7½	<i>a</i> 1 10
Coal.....	2 5	1 7	1 3	6½
"Sulphur".....	½	½	¾	
Coal.....	1½	1 1	1 11	
"Sulphur".....	¼			
Coal.....	6			
"Sulphur".....	½			
Coal.....	4			
Slate.....	½	¼	¼	½
Coal.....	4	9	11	2 9
"Sulphur".....				¼
Coal.....				7
Floor, shale.....				
Thickness of bed.....	5 0	5 5½	5 9	5 9½
Thickness of coal sampled.....	3 10	3 5½	4 1½	3 11½

a Not included in sample.

Section A (sample 69598) was taken in 6 room, 4 left entry. Section B (sample 69597) was taken in 12 room, 3 right, 30 feet from entry. Section C (sample 69595) was taken in 5 room, 3 left entry. Section D (sample 69596) was taken in right main heading.

System of mining, room and pillar. In 1918 the coal was cut by machine in the bottom coal and shot down with black powder and squibs by the miners at any time during the shift. Men employed numbered 80 underground and 10 aboveground. The coal was dumped over a wooden tippie, all being loaded and shipped as run of mine. Haulage was by two electric locomotives. The coal was not usually cleaned after it was loaded in the mine. There was one loading track, with capacity for 20 empty and 20 loaded railroad cars. Sixty-five per cent of the coal was taken out in the advance work, and a total recovery of 85 per cent was claimed. The unmined area consisted of 1,000 acres. The estimated lifetime of the mine was 20 years. The capacity of the mine was 600 tons a day, and the average daily production was 600 tons. The coal was shipped to tidewater for New York and New England to be used for steam and fuel purposes.

ELK LICK. BOYNTON NO. 9 MINE.

Analyses 71065 and 71066, mine samples, and analyses 71103 to 71106, car samples, run-of-mine coal (p. 72.) Semibituminous coal, Somerset field, from Boynton No. 9 mine, a drift mine 1 mile south of Elk Lick, on the Baltimore & Ohio R. R. Coal bed, known as D, or Lower Freeport; Carboniferous age, Allegheny formation. Thickness of bed is about 3 feet. The immediate roof consists of bone 1 foot 6 inches and the main roof and floor of slate. The mine was sampled by N. H. Snyder and H. A. Goodman on June 13, 1919, as described below:

Sections of coal bed in Boynton No. 9 mine.

Section..... Laboratory No.....	A. 71065	B. 71066
Roof, main, shale; immediate, bone.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 10	2 2½
"Sulphur".....		Trace.
Shale.....	<i>a</i> ½	<i>a</i> 1
Coal.....	2	2
"Sulphur".....	<i>a</i> ¼	
Shale.....		<i>a</i> ½
Coal.....	3½	6½
Floor, shale.....		
Thickness of bed.....	4 10	4 6½
Thickness of coal sampled.....	3 4	3 ½

a Not included in sample.

Section A (sample 71065) was cut from 3 right, off main, 500 feet from opening. Section B (sample 71066) was cut from face of main heading, 500 feet from opening.

System of mining, room and pillar. In 1919 the coal was undercut by hand and shot down with black powder. The mine was in course of development and had a capacity of 50 tons a day; it was expected to increase this to 150 tons a day. There were 16 men employed underground and 2 men on the surface. The mine was not operating on day visited. The seam was covered by 1 foot 6 inches of bone which was being removed from the headings. Coal was shipped as run of mine; it is cleaned in the mine, no pickers being employed on the cars.

Car was selected at the tipple and shipped by N. H. Snyder June 13, 1919, which was sampled at the Government fuel yard, Washington, D. C., June 20, 1919, by R. J. Swingle. A 1,000-pound sample was collected by taking successive large shovelfuls of coal at intervals under the car as it was being dumped. Sample was crushed and quartered by mechanical crusher at the Bureau of Mines laboratory, Washington, D. C.

ELK LICK. BOYNTON SMOKELESS MINE.

Analysis 71067 (p. 72). Semibituminous coal, Somerset field, from Boynton Smokeless mine, a drift mine $2\frac{1}{2}$ miles east of Elk Lick, on the Baltimore & Ohio R. R. Coal bed, Upper Kittanning, or C'; Carboniferous age, Allegheny formation. Bed is about 3 feet; main roof, shale; immediate roof, bone; floor, shale. The mine was sampled by N. H. Snyder and H. A. Goodman on June 13, 1919, as described below:

Section of coal bed in Boynton Smokeless mine.

	Ft.	in.
Roof, main, shale; immediate, bone.		
Coal.....	2	7½
Shale ^a		2
Coal.....		6½
Floor, shale.		
Thickness of bed..	4	10
Thickness of coal sampled.....	3	4

Section A was cut from face of main heading, 200 feet from opening.

In 1919 the Boynton Smokeless mine was a new mine not yet in operation. A drift had been driven in about 200 feet and a tipple constructed near the opening. It was expected that operations would begin soon and that about 50 tons a day would be the output. The property contained about 200 acres. The seam was covered by 1 foot 6 inches of bone, which was being removed from the headings. Mining was to be done by hand and haulage by mule.

ELK LICK. CHAPMAN NO. 3 MINE.

Analyses 71063 and 71064, mine samples, and analyses 71107 to 71110, car samples (p. 72). Semibituminous coal, Windber field, from Chapman No. 3 mine, a drift mine 1 mile north-northwest of Elk Lick, on the Baltimore & Ohio R. R. Coal bed, Pittsburgh or Big Vein; Carboniferous age, Monongahela formation. Bed is 6 feet to 7 feet 6 inches thick. The roof and floor are shale, which readily parts from the coal. The mine was sampled by N. H. Snyder and H. A. Goodman on June 13, 1919, as described below:

^a Not included in sample.

Sections of coal bed in Chapman No. 3 mine.

Section.....	A. 71063	B. 71064
Laboratory No.....		
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 1½	2 9½
Shale.....	a ½	a ½
Coal.....	2 ¾	1 ¾
"Sulphur".....	1 6	
Shale.....		1 8
Coal.....	11	2 2
Shale.....	1 8	
Coal.....	1 0	
Floor, shale.		
Thickness of bed.....	6 2 1/16	6 7 1/16
Thickness of coal sampled.....	6 2 1/16	6 7 1/16

a Not included in sample.

Section A (sample 71063) was cut in 2 right, off main entry, 450 feet from opening. Section B (sample 71064) was cut in face of main heading, 3,900 feet from opening.

System of mining, room and pillar. In 1919 coal was undercut by hand and shot down with black powder. The capacity of the mine was 100 tons a day. There were 17 men employed underground and 4 on the surface. The haulage was by mules. The tipple was about a half mile from opening and coal was hauled by mules and dumped over straight dump. The coal was shipped as run of mine. Coal was cleaned in mine, no pickers being employed on the cars.

A car sample (laboratory Nos. 71107 to 71110) of 1,000 pounds was also collected from one loaded car selected at the mine and shipped by N. H. Snyder on June 13, 1919. The car was sampled at the Government fuel yard, Washington, D. C., by R. J. Swingle on June 20, 1919. The sample was crushed and quartered by mechanical crusher at the Bureau of Mines laboratory, Washington, D. C.

SEANOR. EUREKA No. 39 MINE.

Analyses 68200, 68205, 68214, and 30161; also average of tipple samples 68183, 68188, 68194, and 68223 (p. 72). Semibituminous coal, Windber field, from Eureka No. 39 mine, a drift mine ¼ mile south of Seanor station, on the Pennsylvania R. R. Coal bed, known as the Upper Kittanning, or C', seam; Carboniferous age, Allegheny series. Bed is 3½ to 5 feet thick; roof, 2 feet of brown shale or sandstone; floor, hard, smooth underclay; cover at points of sampling, about 100 feet. Commercial samples were taken at the tipple by E. Stebinger in December, 1917. The bed was sampled by E. T. Hancock on December 17, 1917, as described below:

Sections of coal bed in Eureka No. 39 mine.

Section.....	A. 68200	B. 68205	C. 68214
Laboratory No.....			
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 7	3 11	3 9
Shale.....	a 2		
Floor, brown shale.			
Thickness of bed.....	3 9	3 11	3 9
Thickness of coal sampled.....	3 7	3 11	3 9

a Not included in sample.

Section A (sample 68200) was cut at face of 6 left entry, 9 left main. Section B (sample 68205) was cut at face of 11 right entry, 9 left main. Section C (sample 68214) was cut at face of 9 right entry, 9 left main.

The ultimate analysis of a composite sample made by combining face samples 68200, 68205, and 68214 is given under laboratory No. 30161.

In 1917 the coal from this mine was all shipped as run of mine, and storage bins were used. The appearance of the coal on cars was good, and the lumps were large. At time of sampling the capacity of the mine was 1,200 tons a day. Men employed numbered 270 underground.

TENNESSEE.

MORGAN COUNTY.

CATOOSA. FLAT ROCK NO. 3 MINE.

Analyses 29556 to 29559 (p. 73). Bituminous coal from Flat Rock No. 3 mine, a drift mine, about 3 miles from Nemo, the junction point of the Morgan & Fentress R. R. with the Southern system. Coal bed is locally called the Catoosa seam; Carboniferous age, Lee (?) formation. Thickness of bed varies, the average workable thickness being about 33 inches; the seam is irregular, with no partings. The roof is shale of excellent quality and the floor hard fire clay. Cover at points of sampling, about 100 feet. The bed was sampled by J. M. Webb on January 7, 1918, the sample representing 2 feet to 2 feet 9 inches of coal, the total thickness of the bed.

Section A (sample 29556) was cut at face of 4 cross entry, 1 right main. Section B (sample 29557) was cut in 1 cross entry, 3 right main, 700 feet northeast. Section C (sample 29558) was cut at face of main north, 950 feet north.

The ultimate analysis of a composite sample made by combining face samples 29556, 29557, and 29558 is given under laboratory No. 29559.

System of mining, room and pillar. The mine is irregularly laid out, the maintenance of grade on entries and the avoidance of barren areas being the chief consideration. At the time of sampling the coal was shot with permissible explosives, which had just been introduced exclusively; black powder had been previously used. Men employed numbered 40 underground and 6 aboveground. The tipple was of wood. The entire output was shipped as run of mine. Haulage was by mules. There was one loading track, with capacity for 6 empty and 5 loaded railroad cars. The coal on the cars was bright. It was used mainly for steam purposes. In 1918 the estimated lifetime of the mine was 3 years. The daily output at time of sampling was 175 tons.

TEXAS.

WEBB COUNTY.

DOLORES. DOLORES MINE.

Analyses 29021, 29022 (p. 73). Cannel coal, Santo Tomas field, from Dolores mine at Dolores, 23 miles northwest of Laredo. Coal beds, Santo Tomas and San Pedro; Eocene age, Carrizo formation. Roof of Santo Tomas bed, clay and shale, very poor; floor, clay. Roof of San Pedro bed, joint clay; floor, poor, clay. The beds were sampled on August 7, 1917, by G. H. Ashley, as described below:

Section of Santo Tomas coal bed in Dolores mine.

	Ft. in.	
Roof, clay and shale.		
Sandstone.....	^a	10
Shale ^a	1	0
Coal, bony ^a		6
Shale ^a	4	0
Coal.....	2	4
Bone.....		2

^a Not included in sample.

Floor, clay.	Ft. in.
Thickness of bed.....	2 6
Thickness of coal sampled.....	2 6

The section was measured in 20 room, north entry, 800 feet north 60° east from shaft (110 feet deep).

Section of San Pedro coal bed in Dolores mine.

Roof, joint clay.	Ft. in.
Sandstone ^a	10 0
Sandstone and shale interbedded ^a	2 0
Clay jointed ^a	2 0
Coal.....	1 10
Floor, clay.	
Clay ^a	4 0
Coal, bony ^a	1 6
Thickness of bed.....	1 10
Thickness of coal sampled.....	1 10

The section was measured at face of I entry, 1,000 feet due west of shaft.

BETWEEN DOLORES AND DARWIN. HUNT MINE.

Analysis 29023 (p. 73). Cannel coal, Santo Tomas field, from Hunt mine, between Dolores and Darwin. Coal bed, Santo Tomas; Eocene age, Carrizo formation. Roof, sandstone 2 to 3 inches, over clay; floor, clay. The bed was sampled on August 7, 1917, by G. H. Ashley, as described below:

Section of coal bed in Hunt mine.

Roof, sandstone.	Ft. in.
Coal ^a	10
Clay, shaly ^a	1 2
Coal.....	2 2
Floor, clay.	
Thickness of bed.....	4 2
Thickness of coal sampled.....	2 2

The section was measured 30 feet from mine mouth and the sample was taken to study the effect of weathering.

SANTO TOMAS. SANTO TOMAS MINE.

Analysis 29024 (p. 73). Cannel coal, Santo Tomas field, from Santo Tomas mine, 27½ miles northwest of Laredo. Coal bed, Santo Tomas; Eocene age, Carrizo formation. Roof, clay, very poor; floor, clay, poor. The bed was sampled on August 10, 1917, by G. H. Ashley, as described below:

Section of coal bed in Santo Tomas mine.

Roof, clay.	Ft. in.
Coal.....	1 3
Bone.....	2
Coal.....	1 3
Bone ^a	5
Floor, clay.	
Thickness of bed.....	3 1
Thickness of coal sampled.....	2 8

The section was measured at breakthrough between rooms 118 and 119, 2,800 feet from shaft (165 feet deep).

^a Not included in sample.

VIRGINIA.
LEE COUNTY.

POCKETT. REED CREEK MINE.

Analyses 29684 to 29686 (p. 73). Bituminous coal, Black Mountain field, from Reed Creek mine, a drift mine, 2 miles east of Pockett, on the Southern R. R. Coal bed, not known; Carboniferous age, Pottsville group. Bed is about 3 feet thick; coal is very hard, with a 4-inch seam of hard, gray splint coal about 6 inches from the bottom; roof, very good, gray shale; floor, about 1 inch of soft "soapstone" overlying bottom coal; cover at point of sampling, 250 feet. The bed was sampled by J. Henson on January 14, 1918, as described below:

Sections of coal bed in Reed Creek mine.

Section.....	A.	B.
Laboratory No.....	29684	29685
Roof, gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, hard.....	2 0	2 0
Coal, gray splint.....	4½	4½
Coal, soft.....	6	6
Floor, soft "soapstone."		
Thickness of bed.....	2 10½	2 10½
Thickness of coal sampled.....	2 10½	2 10½

Section A (sample 29684) was taken from face of 1 slant, 560 feet north 25° east. Section B (sample 29685) was taken from face of 3 slant, north 85° east from opening.

An ultimate analysis of a composite sample made by combining face samples 29684 and 29685 is given under laboratory No. 29686.

The mine is rated as nongaseous by the State mine inspector and is worked on the room and pillar system. In 1918 the shooting was done on the solid by drilling six or seven holes across the face, loading with from 30 to 45 inches of FFF black blasting powder, tamping with "bug dust," and firing with fuse. No undercutting was done. Haulage was by mules. The daily output of the mine at the time of sampling was 50.

MONTGOMERY COUNTY.

BLACKSBURG. SLUSSER MINE.

Analyses 30689 to 30691 (p. 74). Semibituminous coal, Brushy Mountain field, from Slusser mine, a slope mine 3½ miles north of Blacksburg; no railroad connection. Coal bed, "Big"; Lower Carboniferous age, Price sandstone.

The bed was sampled on May 23, 1918, by M. R. Campbell and R. W. Howell, as follows:

Sections of coal bed in Slusser mine.

Section.....	A.	B.
Laboratory No.....	30689	30690
Roof, not noted.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....		1 ½
Bone.....		a 1 ½
Coal.....		1 ½
Bone.....		a 1 ½
Coal.....	11 ½	6 ½
Shale.....	a 8 ½	a 1 2 ½
Coal.....	6 ½	9
Bone.....	a 2 ½	
Coal.....	11	
Bone.....	a 3 ¾	
Coal.....	1 1	
Floor, not noted.		
Thickness of bed.....	4 8	4 10
Thickness sampled.....	3 5½	3 4½

^a Not included in sample.

Section A (sample 30689) was cut at point 220 feet down slope and 100 feet northeast of slope on level. Section B (sample 30690) was cut at point 225 feet down slope and 200 feet southwest of slope on level.

The ultimate analysis of a composite sample made by combining samples 30689 and 30690 is shown under laboratory No. 30691.

MERRIMAC MINES. MERRIMAC MINE.

Analyses and 30692 and 30797 (p. 74). Semianthracite coal from Merrimac mine of Merrimac Anthracite Coal Corporation, a slope mine at Merrimac Mines, a station on branch lines of both the Norfolk & Western and the Virginian Railroads. Coal bed, "Big"; Lower Carboniferous age, Price sandstone. The bed was sampled on May 13, 1918, by M. R. Campbell and R. W. Howell as follows:

Sections of coal bed in Merrimac mine.

	Ft.	in.
Roof, not noted.		
Coal.....	9	$\frac{1}{4}$
Shale ^a	5	
Coal.....	2	2
Shale ^a	2	
Coal.....	2	0
Floor, not noted.		
Thickness of bed.....	5	$\frac{6}{4}$
Thickness of coal sampled.....	4	$11\frac{1}{4}$

Section A (sample 30692) was cut on fourth level, 2,150 feet west of slope. This level is 600 feet from mine mouth on 20° dip. When sampled the mine had just been unwatered after having stood idle for 10 years. Section B (sample 30697) was a sample from railroad car of so-called "sand coal" from Merrimac mine.

MERRIMAC MINES. PROSPECT.

Analysis 30693 (p. 74). Semianthracite coal from prospect at Merrimac Mines. Coal bed known as "Little" bed; Carboniferous (Mississippian) age, Price sandstone. "Little" bed lies about 100 feet below "Big" bed. The bed was sampled on May 23, 1918, by M. R. Campbell and R. W. Howell. Sample represented coal bed 1 foot 9 inches thick, and was cut in prospect drift 20 feet from mouth of drift. Coal was weathered.

PULASKI COUNTY.

GUNTON PARK. SUMMIT MINE.

Analysis 30696 (p. 74). Semianthracite coal from mine of Summit Coal & Iron Co., a slope mine at Gunton Park, on the Norfolk & Western Ry. Coal bed, "Upper"; Carboniferous (Mississippian) age; Price sandstone. Sampled on May 25, 1918, by M. R. Campbell and R. W. Howell, as described below:

Section of coal bed in Summit Coal & Iron Co. mine.

	Ft.	in.
Roof, not noted.		
Coal, bony ^a	2	2
Coal.....		$5\frac{1}{2}$
Shale ^a		3
Coal.....		$5\frac{1}{2}$
Shale ^a		1
Coal.....		6
Shale.....		2

^a Not included in sample.

Roof, not noted—Continued.

	Ft.	in.
Coal, sampled <i>a</i>	1	4
Shale <i>a</i>		$\frac{1}{2}$
Coal.....	1	$6\frac{1}{4}$

Floor, not noted.

Thickness of bed.....	6	$11\frac{3}{4}$
Thickness of coal sampled.....	4	$3\frac{1}{4}$

The sample was cut in room west of slope, 250 feet from mine mouth.

PARROTT. PARROTT MINE.

Analysis 30694 (p. 74). Semibituminous coal from Parrott mine of Pulaski Anthracite Coal Co., a slope mine at Parrott, on the Norfolk & Western R. R. Coal bed, "Big"; Carboniferous (Mississippian) age; Price sandstone. Bed dips about 20°. The bed was sampled on May 24, 1918, by M. R. Campbell and R. W. Howell, as described below:

Section of coal bed in Parrott mine.

Roof, not noted.

	Ft.	in.
Coal.....	1	$\frac{3}{4}$
Shale <i>a</i>		$3\frac{1}{4}$
Coal.....		$2\frac{3}{4}$
Bone <i>a</i>		2
Coal.....		$3\frac{1}{2}$
Bone <i>a</i>		2
Coal.....		7
Bone <i>a</i>		$5\frac{1}{4}$
Coal.....	1	$6\frac{1}{2}$
Bone <i>a</i>		$3\frac{1}{4}$
Coal.....		$8\frac{1}{4}$
Bone <i>a</i>		$11\frac{1}{4}$
Coal.....		5
Bone <i>a</i>		$\frac{1}{2}$
Coal.....		$4\frac{3}{4}$

Floor, not noted.

Thickness of bed.....	6	8
Thickness of coal sampled.....	5	$2\frac{1}{2}$

The sample was cut 150 feet west of slope and on level 2,750 feet from mine mouth.

PULASKI. LANGHORNE MINE.

Analysis 30695 (p. 74). Semianthracite coal from mine of D. G. Langhorne, 5 miles northeast of Pulaski, in Brushy Mountain field, a drift mine; no railroad connection. Coal bed, "Little"; Carboniferous (Mississippian) age; Price sandstone. The bed was sampled on May 25, 1918, by M. R. Campbell and R. W. Howell, as described below:

Section of coal bed in Langhorne mine.

	Ft.	in.
Coal.....	1	9
Shale <i>a</i>		$1\frac{1}{2}$
Coal.....	2	7
Coal, soft.....		10
Thickness of bed.....	5	$3\frac{1}{2}$
Thickness of coal sampled.....	5	2

The sample was cut at face of main left entry, 250 feet from tunnel, which is 25 feet long.

^a Not included in sample.

RUSSELL COUNTY.

DANTE. CLINCHFIELD No. 2 MINE.

Analyses 32168 to 32172 (p. 75). Bituminous coal, Clinchfield (?) field, from Clinchfield No. 2 mine, at Dante, on the Carolina, Clinchfield & Ohio R. R. Coal bed, Upper Banner; Carboniferous age, Norton formation. Roof, shale; floor, clay or shale. The bed was sampled by A. W. Giles and C. K. Wentworth on June 16, 1919, as described below:

Sections of coal bed in Clinchfield Coal Corp. No. 2 mine.

Section.....	A. 32168	B. 32169	C. 32170	D. 32171
Laboratory No.....				
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 7½	1½	1	1 6
Sandstone.....	a 1			a 1½
Shale.....		a 1	a 2	
Coal.....	1 6	1 5	2	1 4
Sandstone.....		a 2		
Shale.....	a 1		a 5	
Coal.....		1 5	1 4	
Sandstone.....			a 1-2	
Coal.....			1 2	
Clay.....			a 1	a 1
Coal.....			5	
Shale.....		a 1½	a 1-2	
Coal.....	3	3	1 8	
Shale.....	a 1	a 1	a 1	
Coal.....	2	2	1 9	2 5
Floor, clay and shale.				
Thickness of bed.....	5 7½	5 8	7 7	5 5½
Thickness of coal sampled.....	5 4½	5 2½	6 7	5 3

a Not included in sample.

Section A (sample 32168) was measured in 10 right entry, 200 feet off main entry. Section B (sample 32169) was measured in 4 left, near 20 room, off main entry. Section C (sample 32170) was measured in 3 left air course, near 15 room, off 7 right entry. Section D (sample 32171) was measured at 39 room, right cross 4.

The ultimate analysis of a composite sample made by combining free samples 32168, 32169, 32170, and 32171 is given under laboratory No. 32172. At time of sampling the output was 2,000 tons a day.

TAZEWELL COUNTY.

BANDY. CHRISTIAN MINE.

Analysis 25913 (p. 75). Bituminous coal, southwest Virginia field, from Christian mine, 1 mile west of Bandy and Norfolk & Western R. R. Coal bed, Middle Seaboard; Carboniferous age, Lee formation. Roof, clay; floor, clay. The coal was sampled on August 28, 1916, by T. K. Harnsberger, as described below:

Section of coal bed in Christian mine.

	<i>Ft.</i>	<i>in.</i>
Roof, clay.		
Coal.....	1	1½
Clay a.....		1
Coal.....		9
"Rash" a.....		10
Coal.....	1	2
Floor, clay.		
Thickness of bed.....	3	11½
Thickness of coal sampled.....	3	½

The section was measured at face of main entry, 250 feet south, 25° west of mine mouth.

a Not included in sample.

BANDY. PATRICK MINE.

Analysis 25912 (p. 75). Bituminous coal, southwest Virginia field, from Patrick mine, 1½ miles west of Bandy and Norfolk & Western R. R. Coal bed, Lower Seaboard; Carboniferous age, Lee formation. Roof, shale; floor, clay. The coal was sampled on August 28, 1916, by T. K. Harnsberger, as described below:

Section of coal bed in Patrick mine.

	Ft.	m.
Roof, shale.		
"Rash" ^a		8
Coal.....	1	0
"Mother coal".....		4
Coal.....		1½
Clay, hard ^a		2
Coal.....	1	5
"Mother coal".....		4
Coal.....		1
Clay, hard ^a		3
"Rash" ^a		1½
Floor, clay.		
Thickness of bed.....	3	10½
Thickness of coal sampled.....	2	8

The section was measured at face of main entry, 100 feet west of mine mouth.

BIG VEIN. BIG VEIN NOS. 1 AND 2 MINES.

Analyses from No. 1 mine, 67886, 67889, 67902, 67934, 67951, 29908, and car sample 69458 and 69459, and analyses from No. 2 mine, 67927, 67964, 29909, and car samples 69326 and 69327 (p. 75). Semibituminous coal, Pocahontas field, from Big Vein Nos. 1 and 2 mines, slope and shaft mines at Big Vein, 1 mile south of Pocahontas, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pottsville series. Bed is 8 to 16 feet, averaging 10 feet. Fault is encountered at eastern boundary of mine only; no rolls or horsebacks. Vertical depth to landing below entrance, about 60 and 20 feet, respectively. Roof, shale; floor, 2 feet of coal, then shale. Car samples from No. 1 mine were collected at tidewater by H. W. Jarrett on December 1, 1917, and June 17, 1918. Car samples from No. 2 mine were collected at tidewater by E. L. Wallace on April 10 to June 6, 1918. The mines were sampled at two points in No. 1 mine and four points in No. 2 mine by J. J. Bourquin and C. A. Allen on December 18, 1917, as described below:

Sections of coal bed in Big Vein Nos. 1 and 2 mines.

Mine.....	No. 1. A.	No. 1. B.	No. 2. C.	No. 2. D.	No. 1. E.	No. 2. F.
Section.....	67889	67934	67964	67927	67951	
Laboratory No.....	67902	67886				
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 8½	1 5	1 0	1 9	a 2 0	1 7
Gray coal with "sulphur".....	1½	1½		a 4		
"Sulphur" band.....			2		1½	2
Coal.....	10½	1 11	2 5	1 1	2 0	2 3
Coal, gray and bony.....	1	1½	1½	a 1	2	3
Coal.....	1	1 1	4	5 2	3	1 2
Bone.....	2	a 3	2		2	3
Coal.....	1	3 0	2		4	4 0
Bony coal.....	2		2	a 1 6	2	2
Coal.....	6		3 5		6	1 2
Bone.....	a 2½		2½		4	
Coal.....	3 0		1 6		3 2	
Floor, shale.						
Thickness of bed.....	7 0	7 11	9 8	9 11	9 2½	11 0
Thickness of coal sampled.....	6 9½	7 8	9 8	8 0	7 2½	11 0

^a Not included in sample.

Section A (samples 67886 and 67902) was cut in 1 room, Balls Hole entry. Section B (samples 67934 and 67889) was cut in 4 room, Cartersville entry. Section C (sample 67964) was cut in 1 room, 5 right, 75 feet from face. Section D (sample 67927) was cut at face of 2 right, main entry. Section E (sample 67951) was cut from split in pillar, dip heading, 60 feet from face. Section F was cut near 3 room, main, 8 left.

The ultimate analysis of a composite sample made by combining face samples 67886, 67889, 67902, 67951, and 67934 from Big Vein No. 1 mine is given under laboratory No. 29908. The ultimate analysis of a composite sample made by combining face samples 67927 and 67964 from Big Vein No. 2 mine is given under laboratory No. 29909.

System of mining, room and pillar. In December, 1917, the undercutting was done by blasting and the top coal was then shot down. Black powder was used. The capacity of No. 1 mine was about 150 tons a day and No. 2 mine, 350 tons; the average daily shipments were about the same. Both mines were working mostly on pillars. The estimated lifetime of the mines was 5 to 7 years. Haulage was by mules and electric motors; there were two 10-ton and four gathering motors. No. 1 mine shipped all its coal as run of mine. The tipple was only a chute, and the mine cars dumped directly into railroad cars. Top men picked out some of the bone. The mine was old and had been worked irregularly, but was producing good coal. No. 2 mine screened most of its coal with bar screens, having 3 by 6 inch holes and small screens having $1\frac{1}{4}$ by $2\frac{1}{2}$ and 1 by $\frac{1}{2}$ inch holes. The lumps were large. There were four loading tracks at No. 2 mine and one at No. 1 mine, with capacity for 35 loaded and 40 empty cars. Mine No. 2 also has irregular workings. The cars were dumped by rotary dump into a steel conveyor. None of the bone was picked out. Considerable floor coal was left in order to get proper grade or to keep out of water.

BOISSEVAIN. (BOISSEVAIN MINE.)

Analyses 67887, 67888, 67892, 67899, 67900, 67901, 67903, 67904, 67922, 67923, 67925, 67957, 67960, 67971, and 29907, (p. 75). Semibituminous coal, Pocahontas field, from Boissevain mine, a shaft mine at Boissevain on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pocahontas formation, Pottsville group. Bed is 8 to 11 feet thick; dip, 1° to 6° north, 70° west, with a valley. There are a few faults near the shaft. Roof, shale; 12 to 24 inches of top coal is left up during advance work. There is a cap rock of sandstone. Floor, shaly clay, with a smooth surface. Depth of shaft 180 feet. The bed was sampled by J. W. Paul, C. A. Allen, and J. J. Bourquin on December 17, 1917, as described below:

Sections of coal bed in Boissevain mine.

Section.....	A. 67888 67901	B. 67903 67887	C. 67899 67904	D. 67900 67892	E. 67960 67922	F. 67923 67925	G. 67957 67971
Laboratory No.....							
Roof, shale and coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Shale.....	a1						
Top coal.....					a2 0	a2 6	
Coal.....	1 0	1 4	11	11	11	4½	2 0
"Sulphur" band.....	a2	a1½	a1	1			
Bone.....					3	1	3
Coal.....	2 2	1 ½	2 10	1 1½	7	5	7
Bone.....	2 2	1 1	a2	8½	2	2	7
Coal.....	1 8	1 9½	3 6	7	2 2	6	2 10
Bony coal.....	3	a3	a2	a3½	3	2	3
Coal.....	1 6	3 3	2 6	3 3	2 4	2 5	2 7
Bone.....	a3	a4		a3		5	
Coal.....	2 2	2 1½		1 9		2 2½	
Floor, fire clay.							
Thickness of bed.....	9 5	10 4	10 2	9 2½	8 8	9 3	9 1
Thickness of coal sampled..	8 11	9 7½	9 10	8 7	6 8	6 9	9 1

a Not included in sample.

Section A (samples 67888 and 67901) was cut at face of 12 room, C 2 panel, off 5 east. Section B (samples 67903 and 67887) was cut at face of 9 room, A 1 panel, off 5 east. Section C (samples 67899 and 67904) was cut at face of 10 room, II-23, off C-4 entry. Section D (samples 67900 and 67892) was cut near face of main II-22 entry. Section E (samples 67960 and 67922) was cut 50 feet from face of 14 triple entry No. 1. Section F (samples 67923 and 67925) was cut 15 feet from face of 1 room, I-17 entry. Section G (samples 67957 and 67971) was cut on left rib 30 feet from face of J-3 air course.

The ultimate analysis of a composite sample, formed by combining face samples 67887, 67888, 67892, 67899, 67900, 67901, 67903, 67904, 67922, 67923, 67925, 67957, 67960, and 67971 is given under laboratory No. 29907.

System of mining, room and pillar, in panel. In 1917 the coal was undercut by machine in the coal just below the bone and was shot down by 6X black powder. Permissible explosives were used in brushing roof and floor. The shots were fired during shift by the miners. About 300 men were employed underground. Electric locomotives were used for haulage; 10-ton locomotives were used on the main entry and 6-ton cable locomotives for gathering. The steel tippie was provided with conveyor tables, shaking screens, a bone crusher, picking tables, and loading booms. The bone was crushed and reassembled with the other picked coal in the railroad car or loaded with the screenings. Minimum breakage of coal and high efficiency in cleaning should result from the use of the improved facilities of the tippie which had just been completed. About 25 per cent of the coal was mined in advance work. Room pillars were pulled as promptly as possible. They were cut through with 12-foot entries, leaving a 10-foot stump, which was then pulled. The capacity of the mine was about 2,500 tons a day, but at time of sampling the shipments averaged 1,200 to 1,500 tons a day.

For description and analyses of other samples of coal from this mine see Bureau of Mines Bull. 22, pp. 198, 824.

FARADAY. ALTIZER MINE.

Analysis 26101 (p. 76). Semibituminous coal, Pocahontas field, from Altizer mine, $\frac{1}{2}$ mile north of Faraday, flag station on the Norfolk & Western R. R. Coal bed, Pocahontas No. 5; Carboniferous age, Lee formation. Roof, shale; floor, clay. The bed was sampled on September 16, 1916, by T. K. Harnsberger. The section was measured 110 feet north of mine mouth and represented 6 feet 7 inches of coal.

JEWELL. JEWELL RIDGE No. 1 MINE.

Analyses 25651 to 25653 (p. 76). Bituminous coal, southwest Virginia field, from Jewell Ridge No. 1 mine, at Jewell, on the Norfolk & Western R. R. Coal bed, Raven; Carboniferous age, Norton formation. Roof, hard clay, floor, sandstone. The coal was sampled on July 22, 1916, by T. K. Harnsberger, as described below:

Section of coal bed in Jewell Ridge No. 1 mine.

Section.....	A. 25651	B. 25652
Laboratory No.....		
Roof, hard clay.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 8	2 6
"Rash".....	a 4	a 1
Clay, hard.....	a 2	
Coal.....	10	4
"Rash".....		a 1
Clay, hard.....		a 2
"Rash".....		a 2
Coal.....		1 $\frac{1}{4}$
Floor, sandstone.		
Thickness of bed.....	4 0	4 $4\frac{1}{4}$
Thickness of coal sampled.....	3 6	3 $10\frac{1}{4}$

a Not included in sample.

Section A (sample 25651) was measured in 2 right entry, off main entry, 1,900 feet north 60° east of mine mouth. Section B (sample 25652) was measured in 6 main entry, 3,700 feet northeast of mine mouth.

The ultimate analysis of a composite sample made by mixing samples 25651 and 25652 is given under laboratory No. 25653.

POCAHONTAS. WEST POCAHONTAS MINE.

Analyses 67910, 67954, 67958, 67953, and 29912, also car sample 30264 (p. 76). Semi-bituminous coal, Pocahontas field, from West Pocahontas mine, a drift mine at Pocahontas, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3, Carboniferous age, Pottsville group. No cleat, faults, rolls, or horsebacks. Bed is 8 to 11 feet thick, averaging 9 feet. The mine works a high bed of coal. The roof mixes but little with the coal. Roof, 1½ feet or more of shale; floor, soft shale, with smooth surface. Commercial samples were taken at tidewater by N. H. Snyder on February 20 and March 5, 1918. The bed was sampled by C. A. Allen on December 19, 1917, as described below:

Sections of coal bed in West Pocahontas mine.

Section.....	A.	B.	C.
Laboratory No.....	67958	67953	{ 67910 67954
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	^a 1 0	1 2	1 0
"Sulphur" band.....	^a 1	^a 1	^a 1
Coal.....	2 1	1 4	2 6
Bone.....	^a 2	2	^a 3
Coal.....	9	5	5
Bone.....	^a 3	2	.....
Coal.....	4	3	.....
Bone.....	^a 2	^a 4½	^a 3
Coal.....	2 5½	2 6	4 0
Bone.....	.....	^a 1½	.....
Coal.....	2 3	2 5	.....
Floor, shale.			
Thickness of bed.....	9 7	9 0	8 6
Thickness of coal sampled.....	7 11	8 5	7 11

^a Not included in sample.

^b Roof coal, to be mined later.

Section A (sample 67958) was cut at face of 7 room, 11 right, Norton district. Section B (sample 67953) was cut at face of 18 room, 34 heading, Newport News district. Section C (samples 67910 and 67954) was cut at face of 30 room, St. Paul entry, off 10 entry.

The ultimate analysis of a composite sample made by combining face samples 67958, 67953, 67910, and 67954 is given under laboratory No. 29912.

System of mining, room and pillar. In 1917 the coal was undercut by machine in the coal and shot down with black powder by the miners during shift. Very little brushing was required. Men employed underground numbered 290. The haulage was by electric and steam locomotives. There were eleven 6-ton gathering motors, one 10-ton motor, and five 25-ton steam locomotives. About 30 per cent of the coal was taken out in advance work; the percentage of recovery was high. There were still several thousand acres to be mined, and the estimated lifetime of the mine was from 30 to 50 years. Most of the tonnage was to be derived from pillar work. The coal was all shipped as run of mine. By screening, 30 per cent lump may be obtained. There were three bar screens 9 by 8 feet with 4-inch spaces and one length with 5-inch spaces; the small screens had 1½ and ½ inch openings. The coal was picked on railroad cars by 12 pickers on two cars. The pickers remove 15 or 20 tons of refuse matter daily. The efficiency of the pickers was low, so that only a small part of the bone was removed from the coal. The impurity in the coal consisted of bony coal

and gray coal with "sulphur." Storage bin capacity was small. There were three loading tracks for screened coal and two for run of mine, with capacity for 100 empty and 100 loaded railway cars. The lumps were large and had a good appearance. Capacity of mine, 2,000 tons a day; average daily shipments at time of sampling, 1,500 to 2,000 tons; maximum day's run, 4,800 tons.

The mine was sampled in 1909. For description of the bed and analyses of other samples see Bureau of Mines Bull. 22, pp. 200, 827.

POCAHONTAS. BABY MINE.

Analyses 67921, 67924, 67926, and 29906 (p. 77). Semibituminous coal, Pocahontas field, from Baby mine, a slope mine, $\frac{1}{2}$ miles west of Pocahontas, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pocahontas formation. Thickness of seam is 9 to 11 feet, with a slight dip to the southwest; roof, hard, gray shale about 8 feet thick, above which is sandstone. In the greater part of the mine some coal is left up for roof. Floor, soft underclay with smooth surface. The coal separates readily from the roof and floor, but some particles of roof become mixed with the coal. The bed was sampled by J. W. Paul and J. J. Bourquin on December 13, 1917, as described below:

Sections of coal bed in Baby mine.

Section..... Laboratory No.....	A. 67921	B. 67924	C. 67926
Roof, shale and top coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	^a 4 1	2 4	^a 3 9
Bone.....	1	3	2
Coal.....	3	9	4
Bone.....	3	4	2
Coal.....	3 1	5 10	5 6
Bone.....	3		
Coal.....	2 2		
Floor, shale.			
Thickness of bed.....	10 2	9 6	9 11
Thickness of coal.....	8 8	9 6	8 5

^a Upper 1½ feet of coal left up temporarily as roof.

Section A (sample 67921) was cut at face of 19 room, 16 cross entry. Section B (sample 67924) was cut 75 feet from face of 7 room, 4 sump entry. Section C (sample 67926) was cut at face of 36 room, West Gurden entry.

The ultimate analysis of a composite sample made by combining face samples 67921, 67924, and 67926 is given under laboratory No. 29906.

System of mining, room and pillar. In 1917 the coal was undercut by breast machines and shot down by FFF black powder. Men employed numbered 100 underground and 14 on the surface. There were nine gathering electric motors and three main haulage motors. The tippie and bins were steel. Foundations were ready for a new steel tippie with picking tables and loading boom to handle the coal from Baby and West mines. The coal was coming half from advance work and half from pillars; it was screened through 5 and 2½ inch openings; all under 2½-inch size was sent to the bins. The screenings were coked, 900 tons of coke a day being produced in 150 ovens. The bins had storage capacity of 2,000 to 2,500 tons. The coal was picked as it was loaded into the railroad cars by four to six slate pickers. There were three loading tracks, with capacity for 100 empty and 100 loaded railroad cars. The capacity of the mine was 2,500 tons a day, and the average shipments were 1,200 to 1,500 tons a day. This mine is closely connected with the Boissevain and West Pocahontas mines.

For descriptions and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 199, 825.

ANALYSES OF COAL, 1916-1919.

RED ASH. RAVEN RED ASH MINE.

Analyses 25630 to 25632 (p. 77). Bituminous coal, southwest Virginia field, from Raven Red Ash mine, at Red Ash, on the Norfolk & Western R. R. Coal bed, Raven; Carboniferous age, Pottsville group, Norton formation. Roof, hard clay; floor, hard clay. The coal was sampled on July 17, 1916, by T. K. Harnsberger, as described below:

Sections of coal bed in Raven Red Ash mine.

Section.....	A.	B.
Laboratory No.....	25630	25631
Roof, hard clay.	<i>Ft. in.</i>	<i>Ft. in.</i>
"Rash".....	<i>a</i> $\frac{1}{2}$	.....
Coal.....	1 $10\frac{1}{2}$	3 1
"Mother coal".....	$\frac{1}{2}$	.....
Coal.....	$11\frac{1}{2}$	.....
Floor, hard clay.		
Thickness of bed.....	2 $10\frac{1}{2}$	3 1
Thickness of coal sampled.....	2 $10\frac{1}{4}$	3 1

a Not included in sample.

Section A (sample 25630) was measured at face of air course on 10 crossheading, 3,000 feet northeast of 1 drift mouth. Section B (sample 25631) was measured at face of air course to 3 main entry, 2,600 feet north of entrance to 3 drift.

The ultimate analysis of a composite sample made by mixing samples 25630 and 25631 is given under laboratory No. 25632.

RICHLANDS. EAST MINE.

Analyses 25763 to 25765 (p. 77). Bituminous coal, Russell Fork field, from East mine, $1\frac{1}{2}$ miles west of Richlands, on a spur of the Norfolk & Western R. R. Coal bed, Tiller, known as "Little Town Hill;" Carboniferous age, Pottsville group, Norton formation. Roof, sandstone; floor, sandstone. The coal was sampled on August 4, 1916, by T. K. Harnsberger, as described below:

Sections of coal bed in East mine.

Section.....	A.	B.
Laboratory No.....	25763	25764
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	4 4	$11\frac{1}{2}$
Bone.....	.....	<i>a</i> $1\frac{1}{2}$
Coal.....	.....	2 10
Floor, sandstone.		
Thickness of bed.....	4 4	3 11
Thickness of coal sampled.....	4 4	3 $9\frac{1}{2}$

a Not included in sample.

Section A (sample 25763) was measured in 1 room, off main entry, 450 feet northeast of mine mouth. Section B (sample 25764) was measured at face of main entry, 400 feet north 30° east of mine mouth.

The ultimate analysis of a composite sample made by mixing samples 25763 and 25764 is given under laboratory No. 25765.

RICHLANDS. RICHLANDS NO. 2 MINE.

Analyses 31414 to 31416 (p. 77). Bituminous coal, Russell Fork field, from Richlands No. 2 mine, a small opening across the track from No. 4 mine. The drift opening was 5 feet wide at the bottom, 4 feet 7 inches wide at the top, and about 4 feet 10 inches

high from the top of the rail. In 1919 only one entry was being driven, about 600 feet from the opening to the face of the entry. Four mine cars were used. Men employed numbered 10 inside the mine and 2 outside. Two men were employed to push the coal to the outside and dump it in a small bin with a capacity of about 10 tons. The coal is 22 inches high, and dips 40°. The bed was sampled by T. R. Williams on February 3, 1919, as described below:

Sections of coal bed in No. 2 mine.

Section.....	A.	B.
Laboratory No.	31414	31415
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof brushing.....	^a 2 0	^a 2 6
Coal.....	2 3	1 11
Floor, shale.		
Thickness of bed.....	4 3	4 5
Thickness of coal sampled.....	2 3	1 11

^a Not included in sample.

Section A (sample 31414) was cut 150 feet from face, 560 feet from drift opening. Section B (sample 31415) was cut at face, 600 feet from opening.

The ultimate analysis of a composite sample made by combining face samples 31414 and 31415 is given under laboratory No. 31416.

RICHLANDS. RICHLANDS NO. 4 MINE.

Analyses 31417 to 31419 (p. 77). Bituminous coal, Russell Fork field, from Richlands No. 4 mine, a drift mine, $\frac{1}{2}$ mile northwest of Richlands, on the Big Creek branch of the Norfolk & Western R. R. Coal bed, Meadow; Carboniferous age, Pottsville group, Norton formation. Thickness of workable coal, 2 feet 10 $\frac{1}{2}$ inches; dip, 40° north and south; impurities, a shell of shale overlying coal. Frequent rolls are encountered. From 1 to 2 feet of slate lies on top of the coal; above this is hard rock. Roof, rock, averaging about 2 feet in thickness; floor, sandstone; cover at point of sampling, 80 feet. The bed was sampled by T. R. Williams on February 3, 1919, as described below:

Section of coal bed in Richlands No. 4 mine.

Roof, rock.	<i>Ft. in.</i>
Shale ^a	1 $\frac{1}{2}$
Coal.....	2 0
Floor, sandstone.	
Thickness of bed.....	3 $\frac{1}{2}$
Thickness of coal sampled.....	2 0

Sample 31418 was cut 27 feet from face of main entry, 573 feet from drift opening.

A sample was taken by T. R. Williams on February 3, 1919, from a coal pile lying outside of the drift opening. The proximate analysis of this sample is given under laboratory No. 31417. The ultimate analysis of a composite sample made by combining samples 31417 and 31418 is given under laboratory No. 31419.

In February, 1919, the mine was being opened and only one entry, 600 feet long, had been driven. The coal was shot down with permissible explosive at any time by the miners. Three men were employed underground and eight aboveground. A tippie was being erected. The opening of the mine is 5 feet wide, 4 $\frac{1}{2}$ feet high from the top of the rail; there was a 36-inch track gage, but no mine cars or hoisting or electric equipment had been installed. No coal was being loaded at time of sampling.

^aNot included in sample.

RICHLANDS. WEST MINE.

Analyses 25757 to 25759 (p. 77). Bituminous coal, southwest Virginia field, from West mine, $1\frac{1}{2}$ miles west of Richlands, on a spur of the Norfolk & Western R. R. Coal bed, Jawbone, known as "Big Town Hill"; Carboniferous age, Norton formation. Roof, shale; floor, shale. The coal was sampled on August 4, 1916, T. K. Harnsberger, as described below:

Sections of coal bed in West mine.

Section.....	A. 25757	B. 25758
Laboratory No.....		
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
"Rash".....	^a 1	^a 1
Coal.....	10	11
"Rash".....	$\frac{1}{2}$	
Bone.....		^a 1 $\frac{1}{2}$
Coal.....	5	1 9
Bone.....	^a 3 $\frac{1}{2}$	^a 1
Coal.....	1 4 $\frac{1}{2}$	4
Bone.....	^a 6	^a 3
Coal.....	1 4	8
Bone.....	^a 3 $\frac{1}{2}$	
Floor, shale.		
Thickness of bed.....	5 2	4 2 $\frac{1}{2}$
Thickness of coal sampled.....	4 0	3 8

^a Not included in sample.

Section A (sample 25757) was measured at face of 9 entry, off 4 right entry, 1,700 feet north 45° west of mine mouth. Section B (sample 25758) was measured at face of 1 left entry, 1,400 feet west of mine mouth. The ultimate analysis of a composite sample made by mixing samples 25757 and 25758 is given under laboratory No. 25759.

RICHLANDS. WILSON MINE.

Analyses 69806 to 69809 (p. 77). Bituminous coal, Pocahontas or Flat Top field, from Wilson mine, a drift mine 2 miles northwest of Richlands, near the Norfolk & Western R. R. Two coal beds lying almost flat, are worked; the upper, or Red Ash bed, is 5 feet 2 inches thick, without any noticeable partings or impurities, with sandstone top and fire-clay bottom, approximately 300 feet above the railroad track at the point where development was started; the Town Hill bed, 225 feet below the Red Ash, is 4 feet 10 inches thick where sampled and is good coal, although not as clean as the Red Ash. Lenses of bony coal occur at about the middle of the seam, and near the bottom appears a band of soft dirty coal locally known as "rash." Cover at points of sampling, 50 to 100 feet. Each bed was sampled by C. A. Herbert, on July 26, 1919, as described below:

Sections of coal bed in Wilson mine.

Section.....	A. 69806 69807	B. 69808 69809
Laboratory No.....		
Roof, A, sandstone; B, shale and sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	5 2	1 5
Bony coal.....		3
Coal.....		2 2
Bone.....		^a 5
Coal.....		7
Floor, fire clay.		
Thickness of bed.....	5 2	4 10
Thickness of coal sampled.....	5 2	4 5

^a Not included in sample.

Section A (samples 69806 and 69807) was cut at face of drift, 100 feet in by mouth drift. Section B (samples 69808 and 69809) was cut at face of drift, 500 feet from mouth of slope.

At the time of sampling the coal was shot off the solid with black powder. Considerable development was in progress in this field.

RICHLANDS. WYSOR MINE.

Analyses 69802 to 69805 (p. 78). Bituminous coal, Pocahontas or Flat Top field, from Wysor mine, a drift mine $1\frac{1}{2}$ miles northeast of Richlands, on the Norfolk & Western R. R. There are two beds of coal, each about 3 feet in thickness; dip, 45° southeast. The beds crop out on the side of the mountain a short distance from the fault plane. In the upper bed at time of sampling a drift had been driven in approximately 500 feet; the coal was bright and fairly clean, with sandstone top and fire-clay bottom. In the lower bed a drift of approximately 800 feet had been driven; the bed was softer and more splinty and the coal clean except for the top 3 inches, which was soft and dirty, locally known as "rash"; above the coal was "draw slate" 7 to 12 inches, and above that sandstone; the bottom was fire clay; six thin "sulphur" streaks not over $\frac{1}{16}$ inch thick ran through the coal. The two seams were approximately 300 feet apart. Cover at points of sampling, 100 feet.

Each bed was sampled in a prospect drift by C. A. Herbert, on July 26, 1918, as described below:

Sections of coal bed in Wysor mine.

Section.....	A. 69802	B. 69808
Laboratory No.....	69803	69809
Roof, main, sandstone; immediate, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>
"Rash".....	3	
Coal.....	1 4	3 0
"Rash".....	1	
Coal.....	1 8	
Floor, fire clay.		
Thickness of coal bed.....	3 4	3 0
Thickness of coal sampled.....	3 4	3 0

Section A (samples 69802 and 69803) and Section B (samples 69804 and 69805) were taken at face of heading.

SEABOARD. EMPIRE No. $6\frac{1}{2}$ MINE.

Analyses 25760 to 25762 (p. 78). Bituminous coal, southwest Virginia field, from Empire No. $6\frac{1}{2}$ mine, at Seaboard, on the Big O branch of the Norfolk & Western R. R. Coal bed, Upper Seaboard; Carboniferous age, Lee formation. Roof, shale; floor, shale. The coal was sampled on August 5, 1916, by T. K. Harnsberger, as described below:

Sections of coal bed in No. $6\frac{1}{2}$ mine.

Section.....	A. 25760	B. 25761
Laboratory No.....		
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 5 $\frac{1}{2}$	3 0
Bone.....	a 2 $\frac{1}{2}$	
"Rash".....		a $\frac{1}{2}$
Floor, shale.		
Thickness of bed.....	2 8	3 $\frac{1}{2}$
Thickness of coal sampled.....	2 5 $\frac{1}{2}$	3 0

a Not included in sample.

Section A (sample 25760) was measured at face of 3 right entry, 800 feet south of mine mouth. Section B (sample 25761) was measured at face of 2 left entry, 700 feet southeast of mine mouth.

The ultimate analysis of a composite sample made by mixing samples 25760 and 25761 is given under laboratory No. 25762.

WISE COUNTY.

JOSEPHINE. INTERMONT No. 6 MINE.

Analyses 32067 to 32069 (p. 78). Bituminous coal, Black Mountain field, from Intermont No. 6 mine, opened by a drift at Josephine, $2\frac{1}{2}$ miles west of Norton, on the Interstate R. R. Coal bed, Imboden; Carboniferous (Pottsville) age, Norton formation. Bed is 4 feet 8 inches thick; roof, shale and sandstone; floor, clay; cover at points of sampling, 200 feet. The bed was sampled by T. R. Williams on May 28, 1919, as described below:

Sections of Imboden coal bed in Intermont Coal and Iron Co. No. 6 mine.

Section..... Laboratory No.....	A. 32067	B. 32068
Roof, shale and sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 6	1 3
Clay.....	2	2
Coal.....	3 0	3 1
Floor, clay.		
Thickness of bed.....	4 8	4 6
Thickness of coal sampled.....	4 8	4 6

Section A (sample 32067) was cut in 6 room, 50 feet from face, in the pillar between 5 and 6 rooms. Section B (sample 32068) was cut in 7 room, 20 feet through the pillar from fire, 1,700 feet from opening.

The ultimate analysis of a composite sample made by combining samples 32067 and 32068 is given under laboratory No. 32069.

System of mining, room and pillar. In 1919 the coal was shot down with 35 per cent dynamite. There were 20 men employed underground and 8 aboveground. The tippie was of wood. At the time of sampling 100 per cent of the output was derived from advance workings and all the output was shipped as run of mine. Haulage was by mules. There was one loading track, with capacity for five empty cars, and about $\frac{1}{2}$ mile of switch track to main line. The appearance of the coal on the cars was very good. The estimated lifetime of the mine in 1919 was 4 years. The capacity of the mine was 80 tons a day, the maximum day's run being equal to the capacity.

WASHINGTON.

KITTITAS COUNTY.

ELLENSBURG. PROSPECT.

Analysis 26223 (p. 79). Bituminous coal from prospect of the North Manastash Coal Co., in NW. $\frac{1}{2}$ sec. 14, T. 18 N., R. 15 E., 25 miles northwest of Ellensburg. Coal bed, not named; Eocene age, Manashtash formation. The bed was sampled on September 29, 1916, by E. R. Lloyd, and at the point sampled was 3 feet 6 inches thick. The sample was cut 23 feet west of prospect mouth and represented entire thickness of the bed.

LEWIS COUNTY.

CENTRALIA. FORDS PRAIRIE MINE.

Analysis 29564 (p. 79). Subbituminous coal from Fords Prairie mine in NW. $\frac{1}{4}$ sec. 30, T. 15 N., R. 2 W., 3 miles north of Centralia. Coal bed, not named; Eocene age, Puget formation. The bed was sampled on September 12, 1917, by J. Daniels and H. E. Culver. The sample was cut in the main entry, near the last plane. The section was as follows:

Section of coal bed in Fords Prairie mine.

	Ft.	in.
Coal.....	2	7
Shale ^a		1
Coal.....	1	6 $\frac{1}{2}$
Shale ^a		1 $\frac{1}{2}$
Coal.....		9 $\frac{1}{2}$
Shale ^a		$\frac{1}{4}$
Coal.....	1	5
Shale ^a		$\frac{1}{4}$
Coal.....		3 $\frac{1}{2}$
Thickness of bed.....	6	10 $\frac{1}{2}$
Thickness of coal sampled.....	6	7 $\frac{1}{2}$

CENTRALIA. MONARCH MINE.

Analysis 29570 (p. 79). Subbituminous coal from Monarch mine, a slope mine, of Agnew Fuel Co., in NE. $\frac{1}{4}$ sec. 17, T. 14 N., R. 1 W., 6 miles east of Centralia. Coal bed, not named; Eocene age; Puget formation. The bed was sampled at face of slope on September 17, 1917, by J. Daniels and H. E. Culver. The sample represented 7 feet 6 inches of coal which was the thickness of the bed, excepting $\frac{3}{4}$ inch of shale about 1 foot below the top.

CHEHALIS. SUPERIOR MINE.

Analysis 29568 (p. 79). Subbituminous coal from Superior mine in W. $\frac{1}{2}$ sec. 29, T. 14 N., R. 2 W., at Chehalis. Coal bed, Superior No. 2; Eocene age. Puget formation. Roof and floor not noted. The bed was sampled on September 14, 1917, by J. Daniels and H. E. Culver. Section at point of sampling was as follows:

Section of coal bed in Superior Coal Co. mine.

	Ft.	in.
Coal ^a	2	2
Coal.....	5	4
Shale ^a		1
Coal.....	1	4
Shale.....	1	1
Thickness of bed.....	10	0
Thickness of coal sampled.....	3	7

The sample was cut at face of entry, beyond chute 34.

CHEHALIS. SHELDON MINE.

Analysis 29569 (p. 79). Subbituminous coal from Sheldon mine in NE. $\frac{1}{4}$ sec. 33, T. 14 N., R. 2 W., 2 miles southeast of Chehalis. Coal bed, not named; Eocene age. Puget formation. Roof and floor not noted. The bed was sampled on September 14, 1917, by J. Daniels and H. E. Culver. The sample was cut at face of main entry and represented 5 feet 11 inches of coal. The section at point of sampling

^a Not included in sample.

was 7 feet in thickness and carried 1 foot 1 inch of coal near the middle, that was not sampled.

MENDOTA. MENDOTA MINE.

Analysis 29565 (p. 79). Subbituminous coal from Mendota mine in E. $\frac{1}{2}$ sec. 3, T. 14 N., R. 1 W., at Mendota. Coal bed, not named; Eocene age, Puget formation. The bed was sampled on September 12, 1917, by J. Daniels and H. E. Culver, as described below:

Sections of coal bed in Mendota Coal and Coke Co. mine.

	Ft.	in.
Roof, not noted.		
Coal.....	1	$\frac{1}{2}$
Shale.....		$\frac{1}{2}$
Coal.....	2	$11\frac{1}{2}$
Shale.....		$\frac{1}{2}$
Coal.....		2
Shale.....		$\frac{1}{2}$
Coal.....		7
Shale.....		$\frac{1}{4}$
Coal.....	3	1
Floor, not noted.		
Thickness of bed.....	7	$11\frac{3}{4}$
Thickness of coal sampled.....	7	10

Sample was cut at face of 5 north entry, 350 feet from mine mouth. The sample included the streaks of shale.

THURSTON COUNTY.

TONO. HANNAFORD MINE.

Analyses 29566 and 29567 (p. 79). Subbituminous coal from Hannaford mine, a slope mine in NW. $\frac{1}{4}$ sec. 21, T. 15 N., R. 1 W., at Tono. Coal bed, not named; Eocene age, Puget formation. Roof and floor not noted. Samples 29566 (upper bench) and 29567 (mining bench) were taken in 7 room, 2 entry, off 2 main slope, on September 13, 1917, by J. Daniels and H. E. Culver, as described below:

Section of coal bed in Hannaford mine.

	Ft.	in.
Upper bench.		
Coal.....		$7\frac{1}{2}$
Bone.....		$\frac{1}{2}$
Coal.....	1	10
Coal, bony.....	1	5
Mining bench.		
Coal.....	3	6
Shale <i>a</i>		$11\frac{1}{2}$
Coal.....	1	5
Shale <i>a</i>		2
Bone <i>a</i>		10
Shale <i>a</i>		1
Coal.....		11
Shale <i>a</i>		1
Coal.....	2	9
Shale <i>a</i>		$\frac{1}{2}$
Coal, sampled.....		8
Bone <i>a</i>		9
Thickness of bed.....	11	4
Thickness of coal sampled.....	9	3

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 222, 904.

WHATCOM COUNTY.

BELLINGHAM. BELLINGHAM MINE.

Analysis 32034 (p. 79). Bituminous coal from Bellingham mine, a shaft mine 1 mile from Bellingham, in sec. 13, T. 38 N., R. 2 E., on the Bellingham & Northern R. R. Coal bed, No. 1; Eocene age, Puget (?) formation. The bed dips 10°; roof, sandy shale; floor, concealed; cover at point of sampling, 290 feet. The bed was sampled near foot of rock slope by G. W. Evans on May 17, 1919, as described below:

Section of coal bed in Bellingham mine.

Roof, sandy shale.	Ft. in.
Bone.....	1 0
Shale <i>a</i>	2
Coal.....	1 0
Coal and siliceous shale.....	4
Coal.....	1 10
Bone.....	2
Coal.....	1 9
Shale, variable <i>a</i>	$\frac{1}{2}$
Coal.....	5
Shale, hard <i>a</i>	1 $\frac{1}{2}$
Coal.....	5
Shale <i>a</i>	4
Bone <i>a</i>	1 1
Bone <i>a</i>	2 0
Floor, bone.	
Thickness of bed.....	10 8
Thickness of coal sampled.....	6 11

System of mining, room and pillar. At time of sampling the daily output was 100 tons.

WEST VIRGINIA.

BROOKE COUNTY.

COLLIER. LOCUST GROVE NOS. 1 AND 2 MINES.

Analyses 31627 to 31632 (p. 80). Bituminous coal, Wheeling field, from Locust Grove Nos. 1 and 2 mines, drift mines, 1½ miles west of Collier, on the Pennsylvania Lines west. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. The average thickness of workable coal is 4 feet 6 inches. The bed dips slightly to the southeast. A few rolls and clay veins are encountered. Roof, 12 inches "draw slate;" floor, smooth fire clay, which becomes soft, with limestone below. Bed contains shale, "sulphur" stone, and "sulphur" streaks. The bed was sampled by P. D. Browning on March 21, 1919, as described below:

a Not included in sample.

Sections of coal bed in Locust Grove Nos. 1 and 2 mines.

Section Laboratory No.	A. 31627	B. 31628	C. 31629	D. 31630	E. 31631
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal	1 10½	1 1	7½	2½	1 3½
"Mother coal"			1½	1½	
Coal			7½	2½	
"Sulphur" streak		1½		1 0	
Coal		3 1			
"Mother coal"		1 1			
"Sulphur"				a 1½	a 3½
Coal		8	7½	8½	10
Shale	a 3½	a 1½		a 3½	a 1½
Coal	2 3½	3	3	3	3
Shale	a 1	a 1½	a 1	1	a 1½
Coal	4	1 3½			
"Mother coal"	1½				
Coal	8½				
Soft shale	1½				
"Sulphur" streak					
Coal	11½	6 8	1 11½	1 10½	1 8
Floor, fire clay.					
Thickness of bed	4 3½	4 3½	4 3½	4 6	4 3½
Thickness of coal sampled	4 1½	4 1½	4 2½	4 4½	4 0½

a Not included in sample.

Section A (sample 31627) was cut at right rib, at face of main entry. Section B (sample 31628) was cut at slant, at face of 4 face entry. Section C (sample 31629) was cut at right rib, at face of 1 face entry. Section D (sample 31630) was cut at left rib, at face of 5 face entry. Section E (sample 31631) was cut at left rib, at face of 6 left butt.

The ultimate analysis of a composite made by combining face samples 31627, 31628, 31629, 31630, and 31631 is given under laboratory No. 31632.

System of mining, room and pillar with butt entries. In 1919 the coal was undercut by machine in bottom of coal and shot down with black powder by the miners at any time during the shift. There were 250 men employed underground and 45 above-ground. The tippie was constructed chiefly of steel. The coal was screened through bar screens 12 feet long by 6 feet wide, with 1½-inch spaces. About 25 per cent of the coal passed through the screens. Haulage was by six electric locomotives and by mule. Six pickers were employed on car. There were three loading tracks, with capacity for 45 empty and 35 loaded railway cars. The lump coal, medium size, presented a good appearance on cars. There was a recovery of 85 per cent. The unmined area consisted of about 2,500 acres. The estimated lifetime of the mine was 15 years. At the time of sampling the capacity of the mine was 2,500 tons a day, the daily average output 1,200 tons, and the maximum day's run 1,800 tons. The daily output was to be increased to 3,000 tons.

SHORT CREEK. BEECH BOTTOM MINE.

Analyses 31597, 31598, 31599, 31600, 31601, and 31602 (p. 80). Bituminous coal, Wheeling field, from Beech Bottom mine, a drift mine, at Short Creek, 5 miles south of Wellsburg, on the Pennsylvania Lines West. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. The thickness of workable coal is 4 feet 5 inches to 5 feet 3 inches. A few rolls and clay veins are encountered. Streaks of shale and "sulphur," in coal, the former persistent. Roof, 3 to 18 inches "draw slate"; up to 18 inches roof coal; shale above; floor, smooth, soft fire clay; elevation of entrance above sea, 913.30 feet. The bed was sampled by P. D. Browning on March 15, 1919, as described below:

Sections of coal bed in Beech Bottom mine.

Section..... Laboratory No.....	A. 31597	B. 31598	C. 31599	D. 31600	E. 31601
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 6	1 8	2 2½	2 1	1 5
"Mother coal".....	½	½			½
Coal.....	2	4½			4
"Mother coal".....	½	½			½
Coal.....	7	9½			8
Shale.....	a 1	a 1		½	a ½
Bone coal.....			½		
Coal.....	3	9	3	3	1
"Sulphur" streak.....					a ½
Shale.....			a 1	a 1	
"Mother coal".....	½	¾			
Coal.....	2 ¾	1 5½	2 2	2 1½	1 9
Floor, fire clay.					
Thickness of bed.....	4 9	5 3	4 9	4 7	4 5
Thickness of coal sampled.....	4 8	5 2	4 8	4 6	4 4½

a Not included in sample.

Section A (sample 31597) was cut on left rib, 75 feet in 17 room, 6 west, 4 north. Section B (sample 31598) was cut on left rib, at face of 3 entry, 4 north. Section C (sample 31599) was cut at face of 3 east butt, 4 north face. Section D (sample 31600) was cut on left rib, at face of main east. Section E (sample 31601) was cut at neck of 3 east butt, 4 south face.

The ultimate analysis of a composite sample made by combining face samples 31597, 31598, 32599, 31600, and 31601 is given under laboratory No. 31602.

System of mining, double and triple entry, room and pillar, in panels. In 1919 the coal was undercut by machine in bottom of coal and shot down with black powder and a little permissible explosive by miners at any time during the shift. There were 235 men employed underground and 34 aboveground. The tippie was constructed of steel chiefly and of wood. The entire output was crushed. Haulage was by incline and by nine electric locomotives. About 60 per cent of the coal was taken out in advance work, and a total recovery of over 70 per cent was claimed. The unmined area was approximately 3,900 acres. The estimated lifetime of the mine was about 40 years. At the time of sampling, the daily capacity of the mine was 1,400 tons, the actual daily average being 1,200 tons.

FAYETTE COUNTY.**LAYLAND. LAYLAND NOS. 1, 2, 3, AND 4 MINES.**

Analyses 68180, 68186, 68196, 68224, 68225, and 30147; also car samples 69233 and 69234 (p. 80). Semibituminous coal, New River field, from Layland mine, which has four drift openings, called Nos. 1, 2, 3, and 4. The mine is 2 miles north of Layland station, on the Quinnemont branch of the Chesapeake & Ohio R. R. Coal bed, Fire Creek; Carboniferous age, Pottsville group, Quinnemont formation. Bed is 3½ to 4½ feet thick; dip 2 or 3 per cent, generally northeast. There are no general faults; rolls or horsebacks are frequent. Elevation of entrance above sea level, 2,493 feet; roof, thick, brown shale, which does not stick to coal; floor, smooth shale. Commercial samples were taken at tidewater by N. H. Snyder on May 10 to 16, 1918. The bed was sampled by E. T. Hancock and E. Stebinger on January 3, 1918, as described below:

Sections of coal bed in Layland Nos. 1, 2, 3, and 4 mines.

Section Laboratory No.....	A. 68180	B. 68186	C. 68196	D. 68224	E. 68225
Roof, shale.....	<i>Ft. in.</i> 11½	<i>Ft. in.</i> 4 2	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2			9	a 4
Coal, with impure streaks.....				a 1	
Shale.....			10		10
Coal, soft, lustrous.....	2 9		2 7	2 10	2 6
Coal, hard, with splinty fracture.....					
Floor, shale.....					
Thickness of bed.....	3 10½	4 2	3 5	3 8	3 8
Thickness of coal sampled.....	3 10½	4 2	3 5	3 7	3 4

a Not included in sample.

Section A (sample 68180) was cut from face of 8 left, 4 main. Section B (sample 68186) was cut from face of 11 left, 3 main. Section C (sample 68196) was cut from face of 1 room, 26 left, 2 main. Section D (sample 68224) was cut from face of 7 left, main tunnel. Section E (sample 68225) was cut from face of 8 room, 17 left, 1 main.

The ultimate analysis of a composite sample made by combining face samples 68180, 68186, 68196, 68224, and 68225 is given under laboratory No. 30147.

System of mining, room and pillar. There are four main entries, each one constituting a separate mine. In 1918 the coal was undercut by pick and one shortwall machine, and shot down by means of black powder and permissible explosives. There were 200 men working underground and 55 aboveground. Half of the coal was taken out in advance work, and there was a total recovery claimed of 95 per cent. The tippie was of steel. Haulage was by electric motor; 21 locomotives were employed. The coal was all shipped as run of mine and was picked on cars. The lump coal had a good appearance on cars. There were two loading tracks, with capacity for 30 empty and 30 loaded cars. The capacity of the mine was 1,400 tons a day, and the actual average shipments at time of sampling were 750 tons.

For other analyses of this coal see Bureau of Mines Bull. 22, p. 227.

MINDEN. MINDEN NOS. 2, 3, 4, AND 5 MINES.

Analyses 68113, 68127, 68133, and 30149 from No. 2 mine; 30046 from No. 3; 68124, 68125, 68131, and 30150 from No. 4; 68116, 68119, 68120, 68121, and 30151 from No. 5; 69231 and 69232, car samples (p. 81). Bituminous coal, New River field, from Minden mines, drift mines at Minden, on the Minden branch of the Chesapeake & Ohio R. R. Coal bed, Sewell seam; Carboniferous age, Pottsville group, Sewell formation. Bed is 3 to 5 feet thick; dip, 2¼ per cent northwest; roof, clayey shale overlain by sandstone; in parts of mine, roof is sandstone; floor hard, smooth shale. Car samples were taken at tidewater by N. H. Snyder on May 10 to 15, 1918. The bed was sampled at three points in No. 2 mine, one point in No. 3 mine, three points in No. 4 mine, and four points in No. 5 mine by G. H. Ashley on January 1 to 4, 1918, as described below:

Sections of coal bed in Minden Nos. 2, 3, 4, and 5 Mines.

Section Laboratory No.....	A. 68113	B. 68127	C. 68133	D. 68117	E. 68131	F. 68125	G. 68124	H. 68116	I. 68119	J. 68120	K. 68121
Roof, shale; floor, shale.....	<i>Ft. in.</i> 4 5	<i>Ft. in.</i> 5 1	<i>Ft. in.</i> 4 9	<i>Ft. in.</i> 5 2	<i>Ft. in.</i> 3 1	<i>Ft. in.</i> 4 3	<i>Ft. in.</i> 3 7	<i>Ft. in.</i> 4 1	<i>Ft. in.</i> 4 8	<i>Ft. in.</i> 4 4	<i>Ft. in.</i> 3 0
Coal.....											

Section A (sample 68113) was cut at face of 15 room, 1 crosscut, off 10 left, 2 main, No. 2 mine. Section B (sample 68127) was cut in 12 room, 2 main, No. 2 mine. Section C (sample 68133) was cut in 1 crosscut, off 13 left, 1 main, No. 2 mine. Section D (sample 68117) was cut in 20 room, 10 right, 2 main, No. 3 mine. Section E (sample

68131) was cut at head of straight main, No. 4 mine. Section F (sample 68125) was cut at face of 21 room, 9 left, 2 main, No. 4 mine. Section G (sample 68124) was cut in breakthrough off 11 left, 3 main north, No. 4 mine. Section H (sample 68116) was cut in 19 right, 1 main, No. 5 mine. Section I (sample 68119) was cut in 10 right, 3 main, No. 5 mine. Section J (sample 68120) was cut in 15 room, 1 right, 2 main, No. 5 mine. Section K (sample 68121) was cut at face of 1 main, No. 5 mine.

The ultimate analysis of a composite sample made by combining face samples 68113, 68127, and 68125 from No. 2 mine is given under laboratory No. 30149. The ultimate analysis of a composite sample made by combining face samples 68124, 68125, and 68131 from No. 4 mine is given under laboratory No. 30150. The ultimate analysis of a composite sample made by combining face samples 68116, 68119, 68120, and 68121 from No. 5 mine is given under laboratory No. 30151.

System of mining, room and pillar. In 1918 the coal was undercut by machine and shot down by black powder. The total capacity of the group of mines was 2,300 to 2,500 tons a day. Nos. 3 and 4 mines were the largest producers, but No. 5, a newer mine, was doing advance work, and was to be a larger producer. About thirty 6 to 13 ton electric locomotives were used for haulage. Nos. 3, 4, and 5 mines had a large territory to work, but No. 2 mine was becoming exhausted. The coal was all shipped as run of mine.

For description and analyses of other samples from these mines see Bureau of Mines Bull. 22, pp. 234-235, 932-934.

MINDEN. ROCK LICK No. 4 MINE.

Analyses 68114, 68126, 68132, and 30157; also analyses of tipple samples 70120 and 70123 and car samples 69293 and 69294 (p. 81). Bituminous coal, New River field, from Rock Lick No. 4 mine, $1\frac{1}{2}$ miles northeast of Minden station, on the Minden branch of the Chesapeake & Ohio R. R. Coal bed, Sewell; Carboniferous age, Pottsville group, Sewell formation. Bed is 3 feet 10 inches to 4 feet 2 inches thick; roof, clay shale; floor, hard, smooth clay; dip of bed, $1\frac{1}{4}^{\circ}$ west of north. The bed was sampled by G. H. Ashley on January 4, 1918, as described below. Car samples were taken at tidewater by N. H. Snyder on May 17 to 28, 1918. Tipple samples were taken on September 13, 1918, by J. J. Bourquin and S. S. Shirkey.

Sections of coal bed in Rock Lick No. 4 mine.

Section.....	A. 68126	B. 68132	C. 68114
Laboratory No.			
Roof, shale.			
Coal.....	<i>Ft. in.</i> 3 7	<i>Ft. in.</i> 3 3	<i>Ft. in.</i> 3 6
Coal.....			a 4
Floor, clay.			
Thickness of bed.....	3 7	3 3	3 10
Thickness of coal sampled.....	3 7	3 3	3 6

a Not included in sample, on account of the cutting being done in this portion of the coal.

Section A (sample 68126) was cut in face of 2 main. Section B (sample 68132) was cut in face of straight main. Section C (sample 68114) was cut in face of 4 main.

The ultimate analysis of a composite sample made by combining face samples 68114, 68126, and 68132 is given under laboratory No. 30157.

System of mining, room and pillar. In 1918 the capacity of the mine was 600 tons a day, the actual average shipments at time of sampling being 450 tons. Tonnage was to be increased. There were 105 men employed underground and 12 on the surface. Haulage was by electric motors, gathering by small motors and by mules. In advance work 40 per cent of the coal was extracted, and a total recovery of 90 per cent was made. There were over 1,000 acres still to be mined. All coal was shipped run of mine. It was picked on car by one picker.

THURMOND. ROCK LICK NO. 2 MINE.

Analyses 68128, 68129, 68130, and 30158; also tipple samples 70127 to 70130 and car samples 69293 and 69294 (p. 82.) Semibituminous coal, New River field, from Rock Lick No. 2 mine, a drift mine 1 mile north of Thurmond, on the South Side branch of the Chesapeake & Ohio R. R. Coal bed, Fire Creek; Carboniferous (Pottsville) age, Quinnemont formation. Bed is 3 to 6 feet thick; dip, 5 per cent northwest. Faults and rolls or horsebacks are frequent. Roof, blue carbonaceous shale; floor, hard, smooth clay. The bed was sampled by G. H. Ashley on January 5, 1918. Tipple samples were taken on September 14, 1918, by J. J. Bourquin and S. S. Shirkey. Car samples were collected at tidewater by N. H. Snyder on May 17 to 28, 1918.

Section A (sample 68128) was cut at face of 2 left heading. Section B (sample 68129) was cut at face of 2 room, off 2 left. Section C (sample 68130) was cut at face of parting, being cut on 2 left.

The ultimate analysis of a composite sample made by combining face samples 68128, 68129, and 68130 is given under laboratory No. 30158.

System of mining, room and pillar. In 1918 the coal was undercut by machine and shot down with black powder. There were 25 men employed underground and 3 on the surface. Haulage was by a 6-ton motor and by mules. The mouth of the mine is 600 to 800 feet above the railroad track. The coal was dumped from mine cars into a bin, fed into a 7-ton monitor, and lowered to tipple. A 90 per cent recovery was claimed. The estimated lifetime of the mine was 15 to 20 years. The coal was all shipped as run of mine. There were several loading tracks, with capacity for 25 or 30 cars. The capacity of the mine was 200 tons a day, and the average daily shipments at time of sampling were 150 tons.

GRANT COUNTY.

BISMARCK. COSNER MINE.

Analysis 69068 (p. 82). Semibituminous coal, Abram Creek-Stony River field, from Cosner mine, an outcrop mine, $\frac{3}{4}$ mile east of Bismarck. Coal bed, Thomas; Carboniferous age. Thickness and dip not noted. Roof, shale, drab, over 1 foot of black shale; floor, clay. The bed was sampled by G. H. Ashley on April 27, 1918, and consisted at point of sampling of 9 inches of bone, not sampled, at the top, and 2 feet 5 inches of coal. The section was measured at face of entry.

BISMARCK. HAMLINE MINE.

Analysis 69069 (p. 82). Semibituminous coal, Abram Creek-Stony River field, from Hamline mine, $1\frac{1}{4}$ miles east of Bismarck. Coal bed, Davis; Carboniferous age, Allegheny formation. Roof, black shale 2 feet under brown sandstone; floor, clay. The bed was sampled by G. H. Ashley on April 25, 1918, as described below:

Section of coal bed in Hamline mine.

Roof, black shale.	Ft. in.
Coal.....	3½
Clay ^a	3
Coal.....	11
"Clay rock" ^a	4
Coal.....	10
"Clay rock" ^a	3
Coal.....	1 6
Floor, clay.	
Thickness of bed.....	4 4½
Thickness of coal sampled.....	3 6½

The section was measured at face of room being driven to west.

^a Not included in sample.

BISMARCK. OUTCROP.

Analysis 69073 (p. 82). Semibituminous coal, Abram Creek-Stony River field, from an outcrop at the falls of Stony River $\frac{1}{2}$ mile west of Bismarck. Coal bed, Falls. Carboniferous age, Allegheny formation. Roof, black shale 4 feet thick; floor, clay. The bed was sampled at outcrop at water's edge by G. H. Ashley on April 27, 1918. The sample represented 2 feet 10 inches of coal, or the entire thickness of bed, except 2 inches of shale near the middle.

BISMARCK. OUTCROP.

Analysis 69066 (p. 82). Semibituminous coal, Abram Creek-Stony River field, from an outcrop $\frac{1}{4}$ mile above the Falls of Stony River, $\frac{3}{4}$ mile west of Bismarck. Coal bed, Davis; Carboniferous age, Allegheny formation. Roof, black shale 2 feet 4 inches; with sandstone above; floor, clay, with flint clay. The bed was sampled by G. H. Ashley on April 27, 1918. The sample was taken from stock pile dug from bed of river in previous winter and was probably weathered.

HARTMONSVILLE. KITZMILLER MINE.

Analysis 69065 (p. 82). Semibituminous coal, Abram Creek-Stony River field, from Kitzmiller mine, 2 miles southwest of Hartmonsville. Coal bed, Barton; Carboniferous age, Conemaugh formation. The bed is persistent, but is generally less than 4 feet thick; roof, carbonaceous brown shale; floor, clay; cover at point of sampling, 25 to 50 feet. The bed was sampled by G. H. Ashley on April 27, 1918, as described below:

Section of coal bed in Kitzmiller mine.

	Ft.	in.
Roof, shale.		
Coal, bony <i>a</i>	1	8
Coal.....		9
Parting.....		$\frac{1}{2}$
Coal.....	1	0
Parting.....		$\frac{1}{2}$
Coal.....		11
Shale <i>a</i>		1
Coal <i>a</i>		6
Floor, clay.		
Thickness of bed.....	5	0
Thickness of coal sampled.....	2	9

The section was measured at face of main entry.

HENRY. HENRY OR NO. 22 MINE.

Analysis 26579 (p. 82). Semibituminous coal from Henry or No. 22 mine, at Henry, on the Western Maryland R. R. Coal bed, Upper Freeport; Carboniferous age, Allegheny formation. Bed is 6 feet 5 $\frac{1}{4}$ inches to 6 feet 7 $\frac{1}{4}$ inches thick; roof, massive sandstone and shale; floor, shale and fire clay; cover at point of sampling, about 200 feet. The bed was sampled by the Maryland Geological Survey on October 30, 1916, as described below:

Section of coal bed in Henry or No. 22 mine.

	Ft.	in.
Roof, massive sandstone and shale.		
Shale <i>a</i>		2-4
Bony coal <i>a</i>	1	9
Coal.....	4	6
Shale <i>a</i>		$\frac{1}{4}$
Fire clay <i>a</i>		

a Not included in sample.

Floor, shale and fire clay.	Ft.	in.
Thickness of bed.....	6	5½-7½
Thickness of coal sampled.....	4	6

This sample was measured in 3 left butt heading, off Webster heading, about 4,800 feet from shaft bottom. The daily output of the mine in 1916 was 500 tons.

MOUNT STORM. KOONTZ MINE.

Analyses 69064 and 69070 (p. 83). Semibituminous coal and bone, Abram Creek-Stony River field, from Koontz mine, 1 mile north of Mount Storm, on Stony River. Coal bed, Thomas; Carboniferous age, Allegheny formation. Roof, brown shale; floor, clay, hard; cover at point of sampling, 50 feet. The bed was sampled by G. H. Ashley on April 24, 1918, as described below:

Section of coal bed in Koontz mine.

Roof, brown shale.	Ft.	in.
Coal, bony ^a	1	4
Coal.....	2	6
Floor, hard clay.		
Thickness of bed.....	3	10
Thickness of coal sampled.....	2	6

The section was measured at breakthrough from 1 right-hand entry.

HANCOCK COUNTY.

CHESTER. ALLISON COAL BANK.

Analysis 25633 (p. 83). Bituminous coal, Panhandle field, from Allison coal bank, 2 miles south of Chester, in Middle Run Township. Coal bed, Mahoning (Groff); Carboniferous age, Conemaugh formation. Roof, shaly sandstone to sandy shale; floor, clay. The bed was sampled on July 23, 1916, by J. H. Hance and contains 2 feet 1½ inches of coal, overlain by 2 inches of bituminous clay and bone. The section was measured 60 feet south of mine mouth.

CHESTER. JONES'S COAL BANK.

Analysis 25635 (p. 83). Bituminous coal, Panhandle field, from Jones's coal bank, ½ mile south of Chester, in Middle Run Township. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, shale; floor, clay. The bed was sampled on July 18, 1916, by J. H. Hance, as described below:

Section of coal bed in Jones's coal bank.

Roof, shale.	Ft.	in.
Shale, bituminous ^a	1½	
Coal.....	11½	
"Mother coal".....	½	
Coal.....	2	
"Mother coal".....	½	
Coal.....	7	
Shale, bituminous, and clay ^a	½	
Floor, clay.		
Thickness of bed.....	1	10½
Thickness of coal sampled.....	1	8½

The section was measured 65 feet south of west of mine mouth.

^a Not included in sample.

CHESTER. LINE ISLAND COAL BANK.

Analysis 25591 (p. 83). Bituminous coal, Panhandle field, from Line Island coal bank, 2 miles northeast of Chester, opposite east end, Ohio, Grant Township. Coal bed, Middle Kittanning; Carboniferous age, Allegheny formation. Roof, massive sandstone, with 3 inches coaly shale; floor, clay, 15 to 16 feet thick. The coal was sampled on July 15, 1916, by J. H. Hance, as described below

Section of coal bed in Line Island coal bank.

Roof, massive sandstone and shale.		Ft.	in.
Coal.....		9	
Clay ^a			$\frac{1}{8}$
Coal.....		2 $\frac{1}{2}$	
Coal, bony, pyrite ^a			$\frac{1}{8}$
Coal.....		5 $\frac{1}{4}$	
Clay, pyrite band ^a			1 $\frac{1}{2}$
Coal.....		6	
Clay, pyrite band ^a			1
Coal.....	1	7	
Floor, clay.			
Thickness of bed.....		3	9
Thickness of coal sampled.....		3	6 $\frac{1}{4}$

The section was measured in small entry, 70 feet south of mouth of mine and 15 feet from main entry.

CHESTER. SPROUT'S COAL BANK.

Analysis 25634 (p. 83). Bituminous coal, from Sprout's coal bank, 1 $\frac{1}{4}$ miles south of Chester, in Middle Run Township. Coal bed, Lower Freeport; Carboniferous age, Allegheny formation. Roof, shaly sandstone; floor, clay. The bed was sampled on July 18, 1916, by J. H. Hance, as described below:

Section of coal bed in Sprout's coal bank.

Roof, shaly sandstone.		Ft.	in.
Clay shale ^a		3	
Clay, bituminous shale, and bone ^a			1 $\frac{3}{8}$
Coal.....		7 $\frac{1}{2}$	
"Mother coal" and clay.....			$\frac{1}{4}$
Coal.....		10	
Coal, bony ^a			2 $\frac{1}{4}$
Sandy-pyrite band ^a			1
Coal.....		10 $\frac{1}{2}$	
Floor, clay.			
Thickness of bed.....		2	11 $\frac{7}{8}$
Thickness of coal sampled.....		2	4 $\frac{1}{4}$

The section was measured about 15 feet southwest from mine mouth.

^a Not included in sample.

NEW CUMBERLAND. McNEIL-HERRON MINE.

Analysis 25715 (p. 83). Bituminous coal, Panhandle field, from McNeil-Herron mine, 1 mile north of New Cumberland. Coal bed, Groff (Mahoning); Carboniferous age, Conemaugh formation. Roof, shale and sandstone; floor, clay. The bed was sampled on July 28, 1916, by J. H. Hance, as described below:

Section of coal bed in McNeil-Herron mine.

	Ft.	in.
Roof, shale and sandstone.		
Coal.....	2	2½
Clay.....		¾
Coal.....	1	0
Clay and bone ^a		2
Coal.....		2½
Floor, clay.		
Thickness of bed.....	3	7¾
Thickness of coal sampled.....	3	5¾

The section was measured 200 feet north 22° west from mine mouth.

NEW CUMBERLAND. CRESCENT CLAY MINE.

Analysis 25716 (p. 83). Bituminous coal, Panhandle field, from Crescent clay mine, New Cumberland. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Roof, sandstone; floor, clay. The bed was sampled on July 28, 1916, by J. H. Hance, as described below:

Section of coal bed in Crescent clay mine.

	Ft.	in.
Roof, sandstone.		
Coal.....		5¼
Pyrite band.....		¼
Coal.....	1	7
Floor, clay.		
Thickness of bed.....	2	1½
Thickness of coal sampled.....	2	1½

The section was measured 2,500 feet north 80° east from mine mouth.

NEW CUMBERLAND. MARTIN COAL BANK.

Analysis 25714 (p. 83). Bituminous coal, Panhandle field, from Martin coal bank, 2 miles northeast of New Cumberland. Coal bed, Groff (Mahoning); Carboniferous age, Conemaugh formation. Roof, shale and shaly sandstone; floor, clay. The bed was sampled on July 28, 1916, by J. H. Hance, 160 feet south 70° east from mine mouth. The sample represented 3 feet 11 inches of coal and 3 inches of bony coal at the bottom, the entire thickness of the bed.

PUGHTOWN. WERN'S COAL BANK.

Analysis 25713 (p. 83). Bituminous coal, Panhandle field, from Wern's coal bank, Pughtown, 2½ miles northeast of New Cumberland. Coal bed, Groff (Mahoning); Carboniferous age, Conemaugh formation. Roof, shale and shaly sandstone; floor, clay. The bed was sampled on July 29, 1916, by J. H. Hance, as described below:

^a Not included in sample.

Section of coal bed in Wern's coal bank.

Roof, shale and shaly sandstone.	Ft.	in.
Shale, brown sandy ^a	9	—
Clay, coaly ^a		$\frac{1}{2}$
Coal.....	2	5
Clay, coaly ^a		1 $\frac{1}{2}$
Floor, clay.		
Thickness of bed.....	3	3 $\frac{1}{2}$ +
Thickness of coal sampled.....	2	5

The section was measured 110 feet north 35° east of mine mouth.

McDOWELL COUNTY.**ARLINGTON. ARLINGTON MINE.**

Analyses 68026, 68031, 68032, and 29993; also car sample 30253 (p. 83). Semibituminous coal, Pocahontas field, from Arlington mine, a drift mine at Arlington, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pottsville group, Pocahontas formation. Bed is 4 $\frac{3}{4}$ to 6 $\frac{1}{4}$ feet thick; roof, 1 to 4 inches fine shale or clay, 8 to 12 inches hard shale, then shale and sandstone; floor, hard, smooth shale. There are two bone streaks; one is hard and has some "sulphur;" the lower one is softer and plays out in places. Cover at points of sampling, 300 to 500 feet. Car samples were taken at tidewater by N. H. Snyder on December 19 and 20, 1918. The bed was sampled by C. A. Allen on December 27, 1917, as described below:

Sections of coal bed in Arlington mine.

Section..... Laboratory No.....	A. 68032	B. 68026	C. 68031
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, "draw slate."			
Coal.....		$\frac{1}{2}$	1 0
"Mother coal".....		$a \frac{3}{4}$	
Bone.....			$a 3$
Coal and "mother coal".....	3	1 $\frac{3}{4}$	
Coal.....	10	10	1 11
Bone.....	$a 3$		$a 3$
Bone and "sulphur".....		$a 2$	
Coal, slightly bony.....			3
Coal.....	2 1	1 6 $\frac{1}{2}$	5 $\frac{3}{4}$
"Mother coal".....			$\frac{1}{2}$
Coal, bony.....	$a 2\frac{1}{2}$	$a 2\frac{1}{2}$	
Coal.....	1 8 $\frac{1}{2}$	1 10	3 $\frac{1}{4}$
"Mother coal".....			$a \frac{3}{4}$
Coal.....			9
Floor, shale.			
Thickness of bed.....	5 4	4 10	5 3
Thickness of coal sampled.....	4 10 $\frac{1}{2}$	4 4 $\frac{1}{4}$	4 8 $\frac{1}{2}$

^a Not included in sample.

Section A (sample 68032) was cut at face of 10 room, 12 entry. Section B (sample 68026) was cut at face of 10 room, 6 entry. Section C (sample 68031) was cut from 7 pillar, 16 left.

The ultimate analysis of a composite sample made by combining face samples 68026, 68031, and 68032 is given under laboratory No. 29993.

System of mining, room and pillar. In 1917 the coal was undercut by hand and shot down by black powder by the miners during the shift. Men employed numbered 85 underground and 6 aboveground. Haulage was by two 10-ton electric motors, one 3-ton and one 5-ton motor, also by mules. About 35 per cent of the coal was

^a Not included in sample.

taken out in advance work; the percentage of recovery was high. The future tonnage will be derived more largely from pillars than from advance work. There were two loading tracks, with capacity for 37 empty and 50 loaded cars. The coal was screened over 16 by 8 foot bars spaced 4 inches apart; egg, nut, and slack were produced over screens having 2-inch, 1½-inch, and ¾-inch openings. The coal was picked on belt by 10 pickers. The screenings were coked. There was storage bin capacity for 200 tons. The coal was dumped 15 feet into a chute to plunger feeder, which fed it to a retarding conveyor that took it down the hill. From this conveyor the coal slid into a short conveyor 3 feet wide and was elevated to a shaking screen 5 by 8 feet, with ¾-inch holes, which took out part of the slack. The coal then passed to a picking conveyor, where it was picked; it was then dumped over the stationary screens having 4-inch, 2-inch, and 1½-inch spaced bars, and thence down to the cars. Additional lip screens took out remaining slack. All run of mine coal shipped passed over first slack screen to take out slack for coking. Arlington mine was laid out square, had good trackage, and was well maintained. From 1 to 4 inches of clay and "draw slate" came down with the coal. The tippie arrangements were good for getting out good run of mine coal, but there was no chance to pick egg and nut coal. The mine seemed to produce good coal. The capacity of the mine was 800 tons a day, and the average shipments at time of sampling 500 tons a day, according to labor conditions, and were to be increased, if possible. The maximum day's run was 1,500 tons. This mine was sampled in 1909.

For description and analyses of other samples from these mines see Bureau of Mines Bull. 22, pp. 248, 967.

BEAR WALLOW. ROANOKE MINE.

Analyses 67990, 67991, 67993, and 29917 and car sample 30232 (p. 84.) Semi-bituminous coal, Pocahontas field, from Roanoke mine, a drift mine ½ mile east (?) of Bear Wallow station, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pottsville group, Pocahontas formation. Bed is 4½ to 5½ feet thick; roof, good "draw slate" 10 inches thick; floor, hard, smooth clay; dip, slight, irregular in direction, but generally northwest. There is no cleat. Commercial samples were taken at tidewater by N. H. Snyder on February 13 to 16, 1918. The bed was sampled by E. W. Shaw on December 27, 1917, as described below:

Sections of coal bed in Roanoke mine.

Section.....	A. 67990	B. 67991	C. 67993
Laboratory No.....			
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	10	9	10
Bony, "sulphurous" coal.....	a 3		
Bone.....		a 3	a 3
Coal.....	3 10½	3 10	4 10
Floor, hard, sandy clay.			
Thickness of bed.....	4 11½	4 10	5 11
Thickness of coal sampled.....	4 8½	4 7	5 8

a Not included in sample.

Section A (sample 67990) was cut at face of 20 room, 13 entry. Section B (sample 67991) was cut at face of 28 room, 2 diagonal. Section C (sample 67993) was cut at face of 27 room, 15 entry.

The ultimate analysis of a composite sample made by combining face samples 67990, 67991, and 67993 is given under laboratory No. 29917.

System of mining, room and pillar. In 1917 the coal was undercut by machine and shot down by black powder fired by the miners during shift. About 80 men were

employed underground. Two-thirds of the product was shipped as run of mine. The bar screens had 2½-inch openings; the small coal screens had 2-inch and ¾-inch openings. There were 24 coke ovens, and about 60 tons of coke were made per day. Sizes of coal, lump, egg, nut, and slack. Haulage was by four electric locomotives and by mule. There were eight pickers on table and belt; the miners endeavored to reject some of the bone, but most of the picking was done outside. The mine was nearly worked out, there being but 4 or 5 acres still to be mined, and the work was mostly pillar-robbing. There was storage capacity for 300 tons of slack. The capacity of the mine was 800 tons a day, the actual average at time of sampling 400 tons, and the maximum day's run 1,000 tons.

For description and analyses of other samples of coal from this mine see Bureau of Mines Bull. 22, pp. 250, 970.

BERWIND. BERWIND No. 1 MINE.

Analyses 68085, 68091, 68092, and 30171 and tippie samples 70263 to 70266 (p. 84). Semibituminous coal, Pocahontas field; from Berwind No. 1 mine, a drift mine 1½ miles northeast of Berwind, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pottsville group, Pocahontas formation. Bed is 4 to 5 feet thick; roof, sandstone with "draw slate" in parts of mine; floor hard, smooth shale. The bed dips 3½ per cent north 45° west. The bed contains frequent faults. Commercial samples were taken at car loadings by J. J. Bourquin on September 24, 1918. The mine was sampled by S. P. Holt on January 1, 1918, as described below:

Sections of coal bed in Berwind No. 1 mine.

Section..... Laboratory No.....	A. 68091	B. 68085	C. 68092
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 11½	7½	3 1½
"Sulphur".....		a ½	
Coal.....		2 1¾	
Bone.....	a 2¾	a 1¼	a 1¼
Coal.....	1 1	1 1	1 4½
Floor, shale.			
Thickness of bed.....	4 3½	4 0	4 7¼
Thickness of coalsampled.....	4 ¼	3 10½	4 6

a Not included in sample.

Section A (sample 68091) was cut at face of main heading in No. 1¼ mine. Section B (sample 68085) was cut at face of 3 left in No. 1½ mine; Section C (sample 68092) was cut from 1 pillar, 2 left, 3 right.

The ultimate analysis of a composite sample made by combining samples 68085, 68091, and 68092 is given under laboratory No. 30171.

System of mining, room and pillar. In 1918 it was undercut by mining machines and shot down by FFF black powder. Men employed numbered 40 underground and 9 on the surface. The haulage was done by six electric motors. In advance work 66 per cent of the coal was taken out, and a total recovery of 95 per cent was made. The estimated lifetime of mine was 15 years. There were three loading trucks, with capacity for 20 empty and 20 loaded railroad cars. The coal was all screened. There were 1½-inch, 2-inch, and 3-inch openings in the screens. The coal was picked on cars by three pickers. There was a jig washery, with capacity for 500 tons. The screenings were coked. The capacity of the mine was 200 tons a day, and that amount was shipped daily at time of sampling. The tonnage was to be increased to 250 or 300 tons a day.

BERWIND. BERWIND No. 2 MINE.

Analyses 68081, 68087, 68082, and 29978 and car samples 69133 and 69134 (p. 84). Semibituminous coal, Pocahontas field, from Berwind No. 2 mine, a drift mine at Berwind, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pottsville group, Pocahontas formation. Bed is 3 to 5 feet thick; average, 4 feet; dip, 4° northwest. Faults are frequent. Elevation above sea level, 1,488 feet. Commercial samples were taken at tidewater by N. H. Snyder on March 9 to May 3, 1918. The bed was sampled by R. H. Seip on January 1, 1918, as described below:

Sections of coal bed in Berwind No. 2 mine.

Section.....	A. 68081	B. 68087	C. 68082
Laboratory No.....			
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 10½	1 4	2 7½
"Mother coal".....		½	
Coal.....		11½	
Bone.....	a 3½	a 3½	a 2
Coal, high in ash.....	1 10½	1 0	1 6½
Floor, shale and fire clay.			
Thickness of bed.....	5 0½	3 7½	4 4
Thickness of coal sampled.....	4 9	3 4	4 2

a Not included in sample.

Section A (sample 68081) was cut at face of 1 left, off 1 right, off 4 left. Section B (sample 68087) was cut at face of 9 left. Section C (sample 68082) was cut in 8 pillar, 3 right.

The ultimate analysis of a composite sample made by combining samples 68081, 68087, and 68082 is given under laboratory No. 29978.

System of mining, room and pillar. In 1918 the coal was undercut in bottom coal by machines and shot down by means of permissible explosive by the miners during shift. Men employed numbered 40 underground and 8 aboveground. The mine had a steel tippie. The haulage was by means of one 13-ton motor and four gathering motors. Impurities were 2 to 5 inches of bone, and 10 to 14 inches of coal high in ash at bottom of seam, which was sent to washery. Pieces of the roof and floor did not tend to become mixed with the coal in shipping. About 60 per cent of the coal was taken out in advance work; a total recovery of 95 per cent was attained. There were about 5,000 acres yet to be mined from this opening. The estimated life-time of the mine was 20 years. Future tonnage was to be derived, 60 per cent from advance work and 35 per cent from pillars. The coal was all shipped as run of mine. The bottom coal was loaded out separately and sent to washery and used for coking. There were two loading tracks, with capacity for 20 empty and 20 loaded railroad cars. The capacity of the mine in 1918 was 500 tons a day and the average production 250 tons.

BERWIND. BERWIND No. 3 MINE.

Analyses 68070, 68073, 68077, and 29982, and car sample 30234 (p. 85). Semibituminous coal, Pocahontas field, from Berwind No. 3 mine, a drift mine 1½ miles east of Berwind, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pottsville group, Pocahontas formation. Bed is 3 to 5½ feet thick, dips 3° to 4° northwest, and is free from faults; roof, mainly hard sandstone, a little draw slate; floor, ½ to 2 inches soft fire clay, with shale or sandstone below. Surface is smooth. Commercial samples were collected at tidewater by N. H. Snyder on January 28 to February 28, 1918. The bed was sampled by R. H. Seip on January 2, 1918, as described below:

Sections of coal bed in Berwind No. 3 mine.

Section.....	A. 68070	B. 68073	C. 68077
Laboratory No.....			
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 8½	2 6	3 5
Bone.....	a 4	a 4	a 4½
Coal.....	9½	1 8	1 5
Floor, fire clay and sandstone.			
Thickness of bed.....	3 10	4 6	5 2½
Thickness of coal sampled.....	3 6	4 2	4 10

a Not included in sample.

Section A (sample 68070) was cut on 4 pillar, 5 left, off main. Section B (sample 68073) was cut at face of main heading. Section C (sample 68077) was cut at face of 22 room, 5 left, off main.

The ultimate analysis of a composite sample made by combining face samples 68070, 68073, and 68077 is given under laboratory No. 29982.

System of mining, room and pillar. In 1918 it was undercut by shortwall machine in the coal and shot down by black powder by the miners during the shift. Permissible explosive was used for brushing roof or floor. Men employed numbered 62 underground and 10 on the surface. There is a streak of bone of varying thickness through the middle of seam. In mining, 60 per cent of the coal was taken out in advance work, and the total recovery was about 93 per cent. The estimated lifetime of the mine was 10 years. Future tonnage was to be derived 60 per cent from advance work and 30 per cent from pillars. The coal was all shipped as run of mine; it was picked on railroad car by two pickers. There were two loading tracks, with capacity for 14 empty cars and 6 loaded. The bone was separated from the coal by the miner as far as practicable. The capacity of the mine was 500 tons a day, and the average production at time of sampling was 400 tons.

BERWIND. BERWIND NO. 4 MINE.

Analyses 68068, 68067, 68074, and 29979, and car samples 68907 and 68908 (p. 85). Semibituminous coal, Pocahontas field, from Berwind No. 4 mine, a drift mine at Berwind, just above Canebrake, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pottsville group, Pocahontas formation. Bed is 4 to 5½ feet thick, averaging 4½ feet. Dip of bed is 4° northwest. A persistent streak of bone lies 12 to 16 inches above floor; about 6 inches from the top is a persistent streak of gray or harder coal. Near or at the bottom the coal is harder and higher in ash. Where the clay was soft it mixed with coal in loading. In most parts of mine there is an excellent sandstone roof; floor, hard and smooth clay, except in a few places, where it is soft. Elevation of entrance above sea level, 1,800 feet. Commercial samples were taken at tidewater by N. H. Snyder on February 21 and April 3, 1918. The bed was sampled by C. A. Allen on January 2, 1918, as described below:

Sections of coal bed in Berwind No. 4 mine.

Section.....	A. 68068	B. 68067	C. 68074
Laboratory No.....			
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	5½	6½	5
Gray coal.....	1½	1	1
Coal.....	7½	2 8	2 4
"Mother coal".....	1 10½		
Coal.....	a 4	a 4½	a 4½
Bone.....	11	1 4	1 4½
Coal.....			
Floor, clay and shale.			
Thickness of bed.....	4 4	5 0	4 7
Thickness of coal sampled.....	4 0	4 7½	4 2½

a Not included in sample.

Section A (sample 68068) was cut at face of 5 room, 3 right; depth below surface, 100 feet. Section B (sample 68067) was cut at face of 2 room, 8 left; depth below surface, 600 feet. Section C (sample 68074) was cut from 4 pillar, 3 left; depth below surface, 600 feet.

The ultimate analysis of a composite sample made by combining face samples 68068, 68067, and 68074 is given under laboratory No. 29979.

System of mining, room and pillar. In 1918 the coal was shot down by black powder, except near the outcrop, where permissible explosives were used. The coal was undercut. The haulage was by one 13-ton motor and four 6½-ton gathering motors. Men employed numbered 44 underground and 11 on the surface. About 65 per cent of the coal was taken out in advance work; there was a total recovery of 95 per cent. The future production will be about 60 per cent from pillars. The coal was all shipped as run of mine, except cuttings, and was picked on car by two pickers. The cuttings were sent to washery and then coked; machine cuttings were loaded out separately and sent to No. 1 washery. About 45 tons of coke were produced a day. The lumps were rather small and presented only a fair appearance on cars. There were two loading tracks, with capacity for 20 loaded and 20 empty railroad cars. The daily capacity of the mine was 500 tons, and the average production at time of sampling was 250 tons.

BIG SANDY. BIG SANDY MINE.

Analyses 68018, 68021, and 29976, and tipple samples 70267 to 70270 (p. 85). Semibituminous coal, Pocahontas field, from Big Sandy mine, a drift mine, at Big Sandy, on the main line of the Norfolk & Western R. R. Coal bed, Sewell; Carboniferous age, Pottsville group, Sewell formation. The bed varies in thickness from 2½ to 4½ feet, averaging about 3½ feet. Roof is hard shale, which does not fall with the coal; floor, hard shale, with a smooth surface. The cover over the coal is 100 to 800 feet. Commercial samples were taken at the tipple by S. S. Shirkey on September 24, 1918. The bed was sampled by W. T. Lee on December 29, 1917. The samples represented 3 feet 6 inches and 3 feet 9 inches of coal, respectively, which was the entire thickness of the bed where measured.

Section A (sample 68018) was measured at face of 3 crosscut, 17 left entry. Section B (sample 68021) was measured at face of 1 crosscut, 8 right entry.

The ultimate analysis of a composite sample made by combining face samples 68018 and 68021 is given under laboratory No. 29976.

System of mining, room and pillar. In 1917 the coal was shot down with permissible explosive and fired by the miners at any time of the day. Open carbide lamps were in use. The haulage system was electric. The coal is naturally dry, but no sprinkling was done. The property embraced 834 acres. The estimated lifetime of the mine was 18 years. The coal was shipped as run of mine and was picked on a table. About 50 per cent of the coal was lump.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 250, 971.

COALWOOD. OLGA MINE.

Analyses 68094, 68097, 68098, and 30155; also car samples 69404, 69405, 68800, and 68801 (p. 85). Semibituminous coal, Pocahontas field, from Olga mine, a shaft mine, 1½ miles southeast of Coalwood, on the Coalwood branch of the Norfolk & Western R. R. Coal bed, Pocahontas No. 4; Carboniferous (Pottsville) age, Pocahontas formation. Average thickness of bed is about 6 feet; roof, sandstone underlain by shale and locally by shaly fire clay; floor, shale underlain by sandstone. Car samples were taken at tidewater by N. H. Snyder on February 1 to March 8, 1918, and by H. W. Jarrett on

April 25 to June 12, 1918. The bed was sampled by J. W. Paul on December 31, 1917, as described below:

Sections of coal bed in Olga mine.

Section.....	A.	B.	C.
Laboratory No.....	68094	68097	68098
Roof, shaly fire clay.	<i>Fl. in.</i>	<i>Fl. in.</i>	<i>Fl. in.</i>
Coal.....	10 $\frac{3}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{4}$
Shale.....	a 1 $\frac{1}{4}$		a 1 $\frac{1}{4}$
"Sulphur" lens, local.....		a $\frac{1}{2}$	
Coal.....	9	10 $\frac{3}{4}$	
Coal, gray.....	7 $\frac{1}{4}$	3 $\frac{1}{2}$	3
Coal.....	1 3 $\frac{3}{4}$	4 0	8 $\frac{1}{2}$
Coal, gray.....			8 $\frac{1}{2}$
Shale, localized.....	a $\frac{1}{2}$		
Coal.....	2 5		3 6
Floor, hard fire clay.			
Thickness of bed.....	6 1 $\frac{1}{2}$	5 11 $\frac{1}{2}$	6 2
Thickness of coals sampled.....	5 11 $\frac{3}{4}$	5 11	6 $\frac{1}{4}$

a Not included in sample.

Section A (sample 68094) was cut at face of No. 2 development, 2,000 feet from shaft; total depth of cover at point of sampling about 1,200 feet. At this point the miners rejected the 1 $\frac{1}{4}$ -inch band of shale. Section B (sample 68097) was cut at face of 2 left entry, 2 main, 1,500 feet from shaft, at which point the vertical depth from surface was about 1,000 feet. Section C (sample 68098) was cut at face of 1 right entry, No. 2 development, 2,000 feet from shaft, at which point the vertical depth from surface was about 1,000 feet.

The ultimate analysis of a composite sample made by combining face samples 68094, 68097, and 68098 is given under laboratory No. 30155.

System of mining, room and pillar, in panels. In 1917 the mine was about four years old. The tonnage had been increased from two to seven cars daily. There were 74 men employed underground and 20 aboveground. The tippie was steel, with a single cage hoist; the cage was of the platform type. An electric hoisting engine was in use, and the mine purchased its electric power. Electric safety lamps were employed. The haulage was by mule and one 5-ton electric motor. The mine was sprinkled once a week. The coal was undercut by pick in floor and roof and was brought down with permissible explosive by shot firers at any time during the shift. Pieces of the roof had a tendency to become mixed with the coal in mining. From 5 to 10 per cent of the coal was taken out in advance work. The property embraced 17,000 acres of which about 5,000 were yet to be mined from this opening. The estimated lifetime of the mine was about 100 years. The coal was all shipped as run of mine. There were no screens, the coal being picked on the railroad cars by two pickers. There was no storage-bin capacity. The appearance of the coal on cars was similar to that of Pocahontas No. 3 coal; the lumps were of medium size. There was one loading track and track capacity for 25 empty cars and 12 loaded cars. The surface equipment of the mine at time of sampling was only temporary. The coal was being shipped to Portsmouth, Ohio. The capacity of the mine was 500 tons a day in 1917, and the average production was 350 tons. It was expected that the production would be increased to 1,000 tons a day within 10 months.

COOPER. TUG RIVER MINE.

Analyses 67933, 67896, 67898, and 29913; also car samples 69053 and 69054 (p. 86). Semibituminous coal, Pocahontas field, from Tug River mine, a drift mine 5 miles west of Cooper on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 8 $\frac{1}{2}$ to 11 feet thick and dips slightly to the west; roof, "draw slate," with sandstone above; floor, medium hard,

smooth shale. Car samples were collected by N. H. Synder on April 5 to 25, 1918. The bed was sampled by R. H. Seip on December 18, 1917, as described below:

Sections of coal bed in Tug River mine.

Section.....	A. 67933	B. 67896	C. 67898
Laboratory No.....			
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 10	1 7	3 8½
Bone.....	a 3		
Coal, gray.....		3	a 7½
Coal.....	2 8½	5½	2 8½
Bone.....	a 1	a 1½	a 1½
Coal.....	2 7	5 6	2 1
Floor, shale.			
Thickness of bed.....	8 5½	7 10¾	9 3
Thickness of coal sampled.....	8 1½	7 9½	8 6

a Not included in sample.

Section A (sample 67933) was cut at face of main heading, 1½ miles west of drift mouth. Section B (sample 67896) was cut at face of 4 room, 2 crosscut, 2,000 feet north of drift mouth. Section C (sample 67898) was cut at face of 46 room, off 1 slant, 2,500 feet northwest of drift mouth.

The ultimate analysis of a composite sample made by combining samples 67933, 67896, and 67898 is given under laboratory No. 29913.

System of mining, room and pillar. In 1917 the coal was undercut in the coal. The coal was shot down by the use of permissible explosive and FFF black powder by the miners in pillar work and by shot firers in other portions of the work. About 100 men were employed underground. Impurities were bone and "sulphur." Pieces of roof and floor occasionally became mixed with coal. Half of the coal was shipped as run of mine and balance was screened through bar screens, producing egg, nut, pea, and slack sizes. There were six pickers on railroad cars. Ninety tons were coked a day. The storage bin had capacity for 600 tons. Track capacity was 35 empty and 35 loaded cars. The capacity of the mine was 800 tons a day, the average output was 600 tons, and the maximum day's run, 1,200 tons. There were about 400 acres or more to be taken out from present opening. In advance work 25 per cent of the tonnage was taken out. Of the future output of the mine 25 per cent was to be derived from advance work and 70 per cent from pillars. The daily output will probably be increased when new territory is opened up.

DAVY. BLACKSTONE MINE.

Analysis 29889 (p. 86). Semibituminous coal, Pocahontas field, from Blackstone mine, a drift mine ½ mile southeast of station at Davy, on the Norfolk & Western R. R. Coal bed, Sewell or Davy; Carboniferous age, Pottsville group, Sewell formation. Bed is 2½ to 4 feet thick; dip, slight and irregular; roof, massive shale; floor, hard, smooth shale; no cleat or faults occur; low rolls are frequent. The mine was sampled on December 29, 1917, by E. W. Shaw, as described below:

Section of coal bed in Blackstone mine.

	<i>Ft. in.</i>
Roof, massive shale.	
Coal.....	1 1
Coal with bony streaks.....	2
Coal.....	2 3
Floor, shale.	
Thickness of bed.....	3 6
Thickness of coal sampled.....	3 6

The sample was cut at a point in break through between main entry and air course, 1,000 feet southeast of mine mouth.

System of mining, room and pillar. In 1917 the coal remaining in the mine was all in pillars, and the lifetime of the mine was only about 2 years. The coal was brought down by black powder and pick. There were 8 men underground and 2 or 3 on the surface. The haulage was by mule. A bony streak 1 to 3 inches thick occurs above the middle of the coal. Most of the bone was rejected before shipping. The coal was all shipped as run of mine and was picked on car by two or three pickers. There were two loading tracks, with capacity for 15 empty and 15 loaded railroad cars. The capacity of the mine was 75 tons a day, and the average in 1917 was 50 tons daily.

For description and analyses of other samples of coal from this mine, see Bureau of Mines Bull. 22, pp. 252, 976.

DAVY. CLETUS MINE.

Analyses 29892 and car samples 69496 and 69497 (p. 86). Semibituminous coal, Tug River field, from Cletus mine, a drift mine $1\frac{1}{2}$ miles southeast of the station at Davy, on the Norfolk & Western R. R. Coal bed, Davy or Sewell; Carboniferous (Pottsville) age, Sewell formation. Bed is $2\frac{1}{2}$ to 4 feet thick; roof, about 6 inches of "draw slate," over which is cap of sandstone; floor, hard, smooth underclay. Depth of cover, about 150 feet. Car samples were taken at tidewater by H. W. Jarrett on June 6 to 18, 1918. The bed was sampled by E. W. Shaw on December 29, 1917, as described below:

Section of coal bed in Cletus mine.

	Ft. in.
Roof, "draw slate."	
Coal.....	1 0
Bone ^a	1½
Coal with a little "sulphur".....	1 7
Floor, hard shale.	
Thickness of bed.....	2 8½
Thickness of coal sampled.....	2 7

This sample was cut at head of 1 crosscut, off 3 main.

In 1917 the capacity of the Cletus mine was 300 tons a day; actual average at time of sampling, 200 tons. There were about 1,000 acres to be mined, and the estimated lifetime of the mine was 20 to 25 years. Haulage was by five electric locomotives. The impurity in the coal consisted of bone and occasional streaks of "sulphur" and "mother coal." The coal was all shipped as run of mine and was picked on belt at top of incline and on table below by five pickers. The tracks will take care of 11 empty and 20 or 30 loaded cars.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 254, 979.

DAVY. DAVY CROCKETT NO. 2 MINE.

Analysis 29891, average of tippie samples 70215 to 70218, and car samples 69328 and 69348 (p. 86). Semibituminous coal, Pocahontas field, from Davy Crockett No. 2 mine, a drift mine $\frac{1}{2}$ (?) mile north of Davy station, on the Norfolk & Western R. R. Coal bed, Sewell; Carboniferous (Pottsville) age, Sewell formation. Bed is 2 to 4 feet thick and dips slightly and irregularly. No cleat occurs, and few small rolls or horsebacks are encountered. Roof and floor, hard shale. Commercial samples were taken at the tippie by J. J. Bourquin and S. S. Shirkey on September 18, 1918. The bed was sampled by E. W. Shaw on December 28, 1917, as described below:

^a Not included in sample.

Section of coal bed in Davy Crockett No. 2 mine.

	Ft.	in.
Roof, shale.		
Coal.....	1	0
Bone ^a		2
Coal.....	1	10
Floor, shale.		
Thickness of bed.....	3	0
Thickness of coal sampled.....	2	10

The sample was cut in the 11 cross entry of old hallway, 4,000 feet southeast of opening.

System of mining, room and pillar. In 1917 the coal was undercut by machine and shot down with black powder. Haulage was by means of two electric motors and by mules. The coal was clean, with the exception of a small band of bone; occasional lenses of bone and "mother coal" occur. The bone parting is excluded from sample. Half of the coal was shipped as lump, 10 per cent passed over 2½-inch screen, and 40 per cent was shipped as "smithing" coal, having passed through a 2½-inch screen. Screenings were not coked. There were three loading tracks, used by Davy Crockett and Helena mines, with capacity for 25 empty and 25 loaded cars. There were seven pickers on belt. The capacity of the mine was 200 tons a day, and the actual average 150 tons a day at time of sampling. There were still about 100 acres to be mined from this opening.

DAVY. HELENA, OR SUPERIOR NO. 3, MINE.

Analysis 29886 (p. 87). Semibituminous coal, Pocahontas field, from Helena mine, a drift mine ½ mile from Davy station, on the Norfolk & Western R. R. Coal bed, Sewell; Carboniferous (Pottsville) age, Sewell formation. Bed is 2 feet 5 inches to 3½ feet thick; roof, massive clayey shale, 8 feet over coal, 4 feet of which is taken down in main entry; floor, hard smooth shale. Dip of bed is upward to 3° and irregular, generally northwest. No cleat occurs and no faults; few rolls or horsebacks are encountered. The bed was sampled by E. W. Shaw on December 28, 1917, as described below:

Section of coal bed in Helena mine.

	Ft.	in.
Roof, shale.		
Bone.....		2
Coal.....		2
Bone and "mother coal".....		½
Coal.....	2	3
Floor, slate.		
Thickness of bed.....	2	7½
Thickness of coal sampled.....	2	7½

The sample was cut from the head of 23 entry, 4,000 feet north of opening.

System of mining, room and pillar. In 1917 the coal was undercut by pick and shot down with black powder. Two electric motors and 11 mules were used for haulage. Helena and Davy Crockett mines used the same screens and shipping facilities. Half of the coal was shipped as lump, 10 per cent passed over 2½-inch screen, and 40 per cent through 2½-inch screen, the latter being shipped as "smithing" coal. The production of Helena mine at time of sampling was 300 tons a day; capacity, 500 tons a day. There were 400 to 500 acres still unmined. Future shipments were dependent on supply of labor and cars.

^aNot included in sample.

Analyses 70212 to 70214, average of face samples, and analyses 70219 to 70222, average of tipple samples (p. 87). The bed was sampled by J. J. Bourquin and S. S. Shirkey on September 18, 1918, as described below:

Sections of coal bed in Superior No. 3 mine.

Section.....	A. 70213	B. 70214	C. 70212
Laboratory No.....			
Roof, shale.....	<i>Ft. in.</i> 12	<i>Ft. in.</i> 10½	<i>Ft. in.</i> 11
Coal.....	a 1½	a ½	a 2½
Black shale.....	2 ½	1 7½	1 5½
Floor, shale.....			
Thickness of bed.....	3 2	2 6½	2 7
Thickness of coal sampled.....	3 ½	2 6	2 4

a Not included in sample.

Section A (sample 70213) was cut from 15 cross, 3 left, 1¼ miles from opening. Section B (sample 70214) was cut from face of 23 left entry of main entry, 1¼ miles from main opening. Section C (sample 70212) was cut from 5 heading, 1¼ miles from main opening.

System of mining, room and pillar. In 1918 the coal was cut by hand and shot down with black powder at any time during the shift by the miners, powder and dynamite being used for brushing the roof or floor. Men employed numbered 55 underground and 8 aboveground. Sixty per cent of the coal was taken out in advance work, and the total recovery claimed was 95 per cent. The unmined area consisted of 350 acres. The estimated lifetime of the mine was 15 years. Haulage was by electric motors and by mule. There were three loading tracks, with capacity for 26 empty and 26 loaded railroad cars. The coal from this mine and from Superior No. 2 mine was dumped over the same wooden tipple, all being loaded and shipped as run of mine. The coal was cleaned on the belt by two pickers, and there was no inspector at the tipple. The coal as loaded on the railroad cars showed the presence of small pieces of the roof. In loading the miner was instructed to reject the black shale at partings. The coal was being shipped to the tidewater coal exchange for steam use. The capacity of the mine was 600 tons a day, and the average daily output in September, 1918, was 250 tons. The daily tonnage was about 40 per cent of the capacity of the mine.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 253, 978.

ECKMAN. PULASKI NO. 2 MINE.

Analyses 26615 to 26623, and analyses 69014 and 69015, car samples of loaded run of mine coal (p. 87). Semibituminous coal, from Pulaski No. 2 mine, a drift mine at Keystone, 1 mile east of Eckman, on the main line of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Pottsville group, Pocahontas formation. The average thickness of the coal is about 6 feet 3 inches; dip, about 2° north 45° west. The immediate roof is a "draw slate" about 1 foot 6 inches thick, with sandstone above. The floor is a hard, firm underclay. Material from the roof and floor did not tend to become mixed with the coal in mining, as the "draw slate" was easily kept separate from the coal. The bed was sampled by E. H. Denny and W. B. Plank on November 12, 1916, as described below:

Sections of coal bed in Pulaski No. 2 mine.

Sections..... Laboratory No.....	A. 26615	B. 26616	C. 26618	D. 26619	E. 26620	F. 26621	G. 26622
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, impure, soft							^a 4 1
Coal	8 1/2	3	6 1/2	6	6 1/2	7 1/2	4 1/2
Bony coal	^a 2 1/2	^a 4 1/2	^a 3 1/2	^a 2 1/2	^a 3	^a 3	^a 3
Coal	1 9	1 8 1/2	1 8 1/2	2 0	1 8 1/2	1 9 1/2	1 9 1/2
Bony coal	^a 2 1/2	^a 3	^a 1 1/2	^a 2	^a 3 1/2	^a 4	^a 7 1/2
Coal			1 10 1/2	2	1 9 1/2		
"Mother coal"				1 1/2	1 1/2		
Coal, hard			2				
Coal	3 7	3 7	2 3	2	1 1	3 6	3 6
"Mother coal"				1 1/2			
Coal				1			
"Mother coal"				1 1/2			
Coal				3 2			
Floor, underclay.							
Thickness of bed	6 5 1/2	6 2	6 11 1/2	6 7 1/2	5 9 1/2	6 6	6 7
Thickness of coal sampled	6 1/2	5 6 1/2	6 6 1/2	6 3	5 2 1/2	5 11	5 8

^a Not included in sample.

Section A (sample 26615) was measured on the pillar on 3 left, off 34 cross entry, 400 feet from 34 cross entry and 5,600 feet south 40° east from drift mouth. Section B (sample 26616) was measured on the pillar of 4 room, off 1 dip, 1,350 feet south 87° east from drift mouth. Section C (sample 26618) was measured between 10 and 11 rooms, on left inby rib of the third cross entry, off 36 cross entry, 6,450 feet south 70° east from drift mouth. Section D (sample 26619) was measured opposite the first breakthrough in 1 room, off the milk-dairy entry, and 4,650 feet south 22° east from drift mouth. Section E (sample 26620) was measured in the neck of 23 room, off 2 cross entry, off 36 cross entry, and 6,600 feet south 80° east from drift mouth. Section F (sample 26621) was measured at the face of 12 room 20 feet from 1 left entry, off 34 cross entry, and 4,680 feet south 46° east from drift mouth. Section G (sample 26622) was measured at the face of 5 room, 90 feet from the slant, off 5 cross entry, off 36 left entry, and 5,175 feet south 80° east from drift mouth.

Two composite samples were made by combining samples 26615 and 26616 (pillar samples) and samples 26618, 26619, 26620, 26621, and 26622. The results of an ultimate analysis of each of these composite samples are given, respectively, under laboratory Nos. 26617 and 26623. The same coal bed was later sampled by J. J. Bourquin on December 24, 1917, as described below. A commercial sample was taken at tide-water by N. H. Snyder on February 11 to April 10, 1918.

For descriptions and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 255, 983.

Later analysis of sections of coal bed in Pulaski No. 2 mine.

Section..... Laboratory No.....	A. 68011	B. 67929	C. 67956
Roof, hard shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal	6 1/2	6 1/2	5 1/2
Bone	^a 1 1/2	^a 2	^a 1 1/2
"Sulphur" band			
Coal	1 7	1 8 1/2	1 11 1/2
Bone	^a 3	^a 2	^a 2
Coal	4 0	3 9 1/2	4 1
Floor, hard shale.			
Thickness of bed	6 6	6 4 1/2	6 9 1/2
Thickness of coal sampled	6 1 1/2	6 1/2	6 6

^a Not included in sample.

Section A (sample 68011) was cut at face of 12 room, 37 entry, 2 main. Section B (sample 67929) was cut at face of 1 room, 3 crosscut, 36 left. Section C (sample 67956) was cut at face of 8 room, 2 crosscut, 34 entry.

The ultimate analysis of a composite sample made by combining face samples 68011, 67929, and 67956 is given under laboratory No. 29987.

System of mining, entry, room, and pillar. In 1917 the coal was undercut by machine in coal at bottom and shot down by the use of black powder by the miners during shift. Permissible explosive was used in brushing the roof. From 200 to 215 men were employed underground and 25 on the surface. Haulage was by eight electric motors. The coal was screened through shaking screens having 1-inch, 2-inch, and 3½-inch openings. It was picked on a picking table by five pickers. The screenings were coked. The lumps, which were large, had a good appearance. There were two loading tracks, with capacity for 60 empty and 75 loaded cars. In October, 1917, a typical period, this mine produced 28,080 tons, coking 17,482 tons and shipping 10,598 tons of coal. The maximum day's run was 1,500 tons, and the daily average was 900 tons. The estimated lifetime of the mine was about 20 years. The recovery claimed was 95 per cent of the coal. The company operated 390 coke ovens, each producing 2.7 tons of coke daily. The output of coke went to the furnaces of the Pulaski Iron Co., at Pulaski, Va., for the production of iron. The pig iron was used in Government contracts, and the shipments of coal were a secondary matter and varied greatly in tonnage. This mine was sampled also in 1916.

ECKMAN. PULASKI NO. 3 MINE.

Analyses 26610 to 26614 (p. 88). Semibituminous coal, Pocahontas field, from Pulaski No. 3 mine, a drift mine, at Eckman, on the main line of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3, Carboniferous age, Pottsville group, Pocahontas formation. The average thickness of bed is about 7 feet 3 inches; general dip, about 2 per cent northwest. The immediate roof is a "draw slate" 1½ to 3 feet thick, with sandstone above. The floor is a hard, firm, underclay. Material from roof and floor does not tend to become mixed with the coal in mining. The bed was sampled by E. H. Denny and W. B. Plank on November 11, 1916, as described below:

Sections of coal bed in Pulaski No. 3 mine.

Section..... Laboratory No.....	A. 26610	B. 26611	C. 26612	D. 26613
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	7	7	7	9
"Sulphur".....		$\frac{1}{8}$		$\frac{1}{8}$
Bony coal.....	$\frac{1}{2}$		$\frac{1}{2}$	
Coal.....	2 1	1 2½	1 11½	3 9½
"Mother coal".....		$\frac{1}{4}$	1	$\frac{1}{8}$
Coal.....		9½	2½	
Bony coal.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	
Coal.....	1 7	11½	4	
"Mother coal".....		$\frac{1}{2}$	$\frac{1}{2}$	
Coal.....		2	1 3	
"Mother coal".....		$\frac{1}{4}$		
Splint coal.....	2½		1	
Coal.....		2½		
"Mother coal".....		$\frac{1}{4}$		
Coal.....	2 3	2 9	2 1½	3 2½
Floor, underclay.				
Thickness of bed.....	7 1½	7 $\frac{1}{8}$	7 2	7 10
Thickness of coal sampled.....	6 8½	6 9½	6 8	7 9½

^a Not included in sample.

Section A (sample 26610) was measured on the rib of 1 left entry, 1,350 feet from the main entry and 1,500 feet south 85° east from the drift mouth. Section B (sample 26611) was measured at the face of 19 room, 80 feet from 4 left cross entry and 2,475 feet south 51° east from the drift mouth. Section C (sample 26612) was measured on the rib of 3 left entry, 1,800 feet from the main and 2,450 feet south 68° east from the drift mouth. Section D (sample 26613) was measured on the main entry, about halfway between 4 and 5 cross entries and 2,025 feet south 21° east from the drift mouth.

The ultimate analysis of a composite sample made by combining samples 26610, 26611, 26612, and 26613 are given under laboratory No. 26614.

System of mining, room and pillar retreat. In 1916 the coal was undercut by electric machine and shot down by FFFF black powder. Permissible explosive was used for brushing roof and floor when necessary. Mine haulage was by electric locomotive. Carbide miners' lamps were used. The coal passed through the same tipple as that from Pulaski No. 2 mine and was screened into lump, egg, nut, and slack. Some coal was shipped as run of mine. The coal was picked over a picking table after the slack was removed. At time of sampling the output was about 250 tons a day; capacity, 300 tons a day. The future output was to come entirely from advance work, the mining having consisted only in driving the entries and narrow work. The estimated lifetime of the two mines was 16 years, there being about 150 acres of solid coal.

ECKMAN. SHAWNEE MINE.

Analyses 67937, 67938, 67935, and 29915 and car samples 68839 and 68840 (p. 88). Semibituminous coal, Pocahontas field, from Shawnee mine, a drift mine at Eckman, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 6 to 7½ feet thick; roof, 2 feet of shale, over which is sandstone; floor, hard, smooth shale; dip, about 1° west; no cleat; no faults. Commercial samples were taken at tidewater by N. H. Snyder on February 6 to March 23, 1918. The bed was sampled by C. A. Allen on December 24, 1917, as described below:

Sections of coal bed in Shawnee mine.

Section.....	A.	B.	C.
Laboratory No.....	67937	67938	67935
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2½	3	3½
"Sulphur" band.....	a ¾	a 1	a ¾
Coal.....	10	2 4	2 3
Coal, gray.....	1		
Coal.....	1 4		
Bone.....	a 1	a 1	a 4
Coal.....	1 9	3 6	1 ½
"Mother coal".....	1		½
Coal.....	2 2		3 3
Floor, shale.			
Thickness of bed.....	6 7	6 3	7 3
Thickness of coal sampled.....	6 5½	6 1	6 10½

a Not included in sample.

Section A (sample 67937) was cut at face of 8 room, 2 main; depth from surface, 550 feet. Section B (sample 67938) was cut on 24 pillar, 2 right; depth from surface, 500 feet. Section C (sample 67935) was cut on 31 pillar, 4 right; depth from surface, 350 feet.

The ultimate analysis of a composite sample made by combining face samples 67937, 67938, and 67935 is given under laboratory No. 29915.

System of mining, room and pillar. In 1917 the coal was undercut by pick and shot down with black powder and permissible explosive by the miners during shift.

About 100 men were employed underground and 25 on the surface. There was a steel tippie. Haulage was by two 10-ton locomotives and by mules. The mine made a large amount of dust, and salt was used for humidifying the dust in places where the sprinkler did not reach. Impurity consisted of gray shale in the roof, which tended to scale off and break into fine pieces. There were two loading tracks, with capacity for 30 empty and 35 loaded cars. Over 90 per cent of the coal was shipped as run of mine, of which 22 per cent was lump over $3\frac{1}{2}$ -inch bar screens; the egg size was screened over $1\frac{1}{2}$ -inch bars and the nut over $\frac{3}{8}$ -inch bars. Of the total production 55 per cent was slack, passing through $\frac{3}{8}$ -inch screens. The picking was done in railroad car by 8 to 10 pickers, in charge of an inspector. The pickers took out 2 or 3 tons of slate and 5 or 6 tons of bone and "sulphur" daily. The capacity of the mine was 600 tons a day; average production, 400 tons. The probable lifetime of the mine was about 20 years, there being about 500 acres to be mined. Most of the future tonnage was to be from pillars.

For descriptions and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 255, 981.

ELKHORN. HOUSTON NOS. 1 AND 2 MINES.

Analyses 67955, 67959, and 29989 from No. 1 mine and 67962, 67969, 67970, and 29990 from No. 2 mine; also car samples 68802 and 68803 (p. 88). Semibituminous coal, Pocahontas field, from Houston Nos. 1 and 2 mines, drift mines at Elkhorn, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 6 to 9 feet thick; roof, "draw slate;" floor, hard shale. Commercial samples were taken at tidewater by N. H. Snyder on February 23 to March 11, 1918. The beds were sampled by R. H. Seip and S. P. Holt on December 28, 1917, as described below:

Sections of coal bed in Houston Nos. 1 and 2 mines.

Section..... Laboratory No.....	A. 67959	B. 67955	C. 67970	D. 67962	E. 67969
Roof, "draw slate"..... "Mother coal" and coal..... Coal..... Bone..... Coal..... Floor, shale..... Thickness of bed..... Thickness of coal sampled.....	<i>Ft. in.</i> 1 1½ a 3 4 1½ 5 6 5 3	<i>Ft. in.</i> 1 4 a 2 4 6½ 6 ½ 5 10½	<i>Ft. in.</i> 1 3½ a 2½ 4 5 5 11 5 8½	<i>Ft. in.</i> 3 2 4 4 5 9½ 5 9	<i>Ft. in.</i> 1 4 a 4 3 8 5 4 5

^a Not included in sample.

Section A (sample 67959) was cut on 16 pillar, 39 entry, mine No. 1. Section B (sample 67955) was cut on 21 pillar, 40 cross entry, mine No. 1. Section C (sample 67970) was cut on 5 pillar, 38 cross entry, mine No. 2. Section D (sample 67962) was cut at face of 3 room, 44 cross entry, mine No. 2. Section E (sample 67969) was cut on 6 pillar, 24 cross entry, mine No. 2.

The ultimate analysis of a composite sample made by combining samples 67955 and 67959 is given under laboratory No. 29989. The ultimate analysis of a composite sample made by combining samples 67962, 67969, and 67970 is given under laboratory No. 29990.

System of mining, room and pillar. In 1917 the coal was undercut by pick and shot down with FFFF black powder and permissible explosives by the miners during shift. About 60 per cent of the output was shipped as run of mine, the balance going through bar screens with 4-inch openings and through revolving screens with $\frac{3}{4}$ and $1\frac{1}{4}$ -inch openings. The screenings were crushed and coked, there being 300 tons of coke produced daily. The coal was picked on the car by nine pickers. The track capacity could take care of 50 empty and 50 loaded cars. The daily capacity

of No. 1 mine was 450 tons and of No. 2 mine 1,000 tons; the actual daily average shipments at time of sampling were 250 and 750 tons, respectively. There were 45 and 165 men, respectively, employed underground and 87 on the surface for the two mines. Haulage was by mule and motor, there being a total of six motors used. In advance work 35 per cent of the coal was taken out; a total of 95 per cent recovery was made. There were still from 100 to 200 acres to be mined from these two openings, which had a probable lifetime of 15 years. The coal was shipped to Lambert's Point, Va., and to Sandusky, Ohio, docks (the latter going to lake ports) and to Youngstown, Canton, Toledo, and other points in Ohio and Indiana. The coke was shipped to Roanoke, Va., and Wellston, Ohio.

FARADAY. PRESSLY MINE.

Analysis 26159 (p. 89). Semibituminous coal, Pocahontas field, from Pressly mine, 4 miles east of Faraday, flag stop on the Norfolk & Western R. R. Coal bed, Pocahontas No. 5; Carboniferous (Pottsville) age, Pocahontas formation. Roof, shale; floor, clay. The bed was sampled on September 20, 1916, by T. K. Harnsberger. The sample represented 3 feet 9½ inches of coal; 3 inches of "rash" was not included in the sample. The section was measured in 3 room, on right of main entry, 200 feet west of mine mouth.

GILLIAM. GILLIAM MINE.

Analyses 68000, 68023, 68022, and 29992; also car sample 30238 (p. 89). Semibituminous coal, Pocahontas field, from Gilliam mine, a drift mine at Gilliam, on the North Fork branch of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3 seam; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 4½ to 6 feet thick; roof, strong, dark shale underlain with 3 inches of "draw slate." It is stated that a 16-inch seam of coal lies 15 feet above this bed. Floor, hard shale with smooth surface. Commercial samples were taken at tidewater by N. H. Snyder on January 28 to February 13, 1918. The bed was sampled by W. T. Lee on December 27, 1917, as described below:

Sections of coal bed in Gilliam mine.

Section.....	A. 68023	B. 68022	C. 68000
Laboratory No.....			
Roof, shale.			
Coal.....	<i>Ft. in.</i> 1 3	<i>Ft. in.</i> 1 3	<i>Ft. in.</i> 1 3
Coal, bony.....	<i>a</i> 1½	<i>a</i> ¾	<i>a</i> 3
Coal.....	3 4	3 10	3 10
Floor, shale.			
Thickness of bed.....	4 8½	5 1¾	5 4
Thickness of coal sampled.....	4 7	5 1	5 1

a Not included in sample.

Section A (sample 68023) was cut in 3 crosscut, at face of 2 main. Section B (sample 68022) was cut in 3 crosscut, at face of 6 room. Section C (sample 68000) was cut in 6 crosscut, at face of 28 room.

The ultimate analysis of a composite sample made by combining face samples 68000, 68022, and 68023 is given under laboratory No. 29992.

System of mining, room and pillar. In 1916 the coal was undercut by machine, the cutting being done in the coal. The coal was shot down with black powder by the miners during the shift. Permissible explosive was used in brushing roof and floor. The capacity of the mine at time of sampling was 900 tons a day, although the actual average shipments were only about 700 tons. Open carbide lamps were used. The haulage was by mules and electric motor. There were two loading tracks, with a total capacity of about 20 empty railroad cars.

For descriptions and analyses of other samples of coal from this mine see Bureau of Mines Bull. 22, pp. 260, 991.

HARTWELL. BERWIND No. 5 MINE.

Analyses 68069, 68072, 68076, and 29980 and car sample 30263 (p. 89). Semibituminous coal, Pocahontas field, from Berwind No. 5 mine, a drift mine $\frac{3}{4}$ mile southwest of Hartwell, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 3 to 5 feet thick; roof, sandstone; floor, soft, smooth shale. The bed dips 6 per cent west and contains three faults and horsebacks. Commercial samples were taken at tidewater by N. H. Snyder on February 11 to March 6, 1918. The bed was sampled by S. P. Holt on January 2, 1918, as described below:

Sections of coal bed in Berwind No. 5 mine.

Section.....	A. 68069	B. 68072	C. 68076
Laboratory No.....			
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
"Rash".....	a 5		
Bone.....		a 2 $\frac{1}{4}$	
Coal, cube.....			a 1 $\frac{1}{2}$
Coal.....	2 5	2 5 $\frac{1}{2}$	2 7
Bone.....	a 4 $\frac{3}{4}$	a 2	a 2 $\frac{1}{2}$
Coal.....	7	1 0	2 $\frac{1}{2}$
Bone.....	a 2		a $\frac{1}{2}$
Coal.....	1 0		10 $\frac{1}{2}$
Bone.....			a 1 $\frac{1}{2}$
Coal.....			7
Floor, shale.			
Total thickness of bed.....	4 11 $\frac{3}{4}$	3 9 $\frac{3}{4}$	4 8 $\frac{3}{4}$
Thickness of coal sampled.....	4 0	3 5 $\frac{1}{2}$	4 2 $\frac{1}{2}$

a Not included in sample.

Section A (sample 68069) was cut at face of main heading. Section B (sample 68072) was cut from chain pillar between 3 and 4 room, 3 left. Section C (sample 68076) was cut at face of 2 right.

The ultimate analysis of a composite sample made by combining face samples 68069, 68072, and 68076 is given under laboratory No. 29980.

System of mining, room and pillar. In 1918 the coal was undercut by machine and shot down by FFF black powder. There were 55 men employed underground and 9 on the surface. Haulage was by four gathering electric locomotives and one larger locomotive. The tonnage in the future will be derived largely from pillars. The output could have been increased to 375 tons by additional labor and cars. The coal was all shipped as run of mine and was picked on cars by three pickers. There was storage-bin capacity for 100 tons. There was loading track capacity for 30 empty and 30 loaded cars. The capacity of the mine was 325 tons a day, and the average shipments at time of sampling were 275 tons daily.

HAVACO. HAVACO (FORMERLY JED) MINE.

Analyses 67996, 68019, 68020, and 29991; also car samples from eight cars, analysis 30237 (p. 89). Semibituminous coking coal, Pocahontas field, from the Havaco (formerly Jed) mine, a shaft mine at Havaco, on the Tug Fork branch of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. The bed varies in thickness from 4 feet 8 inches to 5 feet 5 inches, with an average of 5 feet, and has a dip of about 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ ° north 45° west; roof, strong bedded sandstone underlain in places with 12 to 15 inches of treacherous slate that does not fall regularly with the coal, but is brushed in the entries; floor, 12 to 18 inches of hard

clay with smooth surface. Commercial samples were taken at tidewater by N. H. Snyder on January 14 to February 13, 1918. The bed was sampled by W. T. Lee on December 28, 1917, as described below:

Sections of coal bed in Havaco mine.

Section..... Laboratory No.....	A. 67996	B. 68019	C. 68020
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 2	1 11½	2 0
Bony coal.....	a 3	a 3	a 3½
Coal.....	2 11½	2 11½	2 11
Floor, shale.			
Thickness of bed.....	5 4½	5 2	5 2½
Thickness of coal sampled.....	5 1½	4 11	4 11

a Not included in sample.

Section A (sample 67996) was cut at face of 1 main. Section B (sample 68019) was cut at face of 8 right main. Section C (sample 68020) was cut at face of 15 right, 1 left main.

The ultimate analysis of a composite sample made by combining face samples 67996, 68019, and 68020 is given under laboratory No. 29991.

System of mining, room and pillar. In 1917 the coal was undercut by electric chain machines and shot down with permissible explosive at any time of the day by shot firers. Steel tipples with self-dumping cages were in use. Electric safety lamps were used by miners, and electric lighting on the main roads. Haulage was by electric motor. The mine was sprinkled regularly. A large area of coal remained to be mined, and most of the future tonnage was to be from advance work. The coal was picked in the cars by four pickers and shipped as run of mine. There were four loading tracks, with a total capacity for 75 empty railroad cars. The production capacity was 1,200 tons a day, although at time of sampling, owing to railroad conditions, the production only averaged about 500 tons.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 261, 993, and Bull. 85, pp. 116 and 355.

HEMPHILL. WELCH MINE.

Analyses 26582 to 26587 (p. 89). Semibituminous coal, Pocahontas field, from Welch mine, a drift mine, at Hemphill, ½ mile west of Welch, on a short spur from the main line of the Norfolk & Western R. R. Coal bed, Welch; Carboniferous (Pottsville) age, New River series. The bed lies practically flat; average thickness, about 3 feet 9 inches; roof, hard, firm shale; floor, called sandstone, but probably sandy shale. Material from roof and floor did not become mixed with the coal when mined. The bed was sampled by E. H. Denny and W. B. Plank on November 10, 1916, as described below:

Sections of coal bed in Welch mine.

Section..... Laboratory No.....	A. 26582	B. 26583	C. 26584	D. 26585	E. 26587
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, soft.....	11	11½	11½	11	
"Sulphur" band.....		1½			
Coal, hard.....	2¾	2¾	3½	1 4½	
Coal.....	2 4¼	1 11¼	1 11	1 1	4 9
Coal and "sulphur" band.....		½			
Coal.....		5			
Floor, hard, sandy shale.					
Thickness of bed.....	3 6	3 7⅞	3 2	3 4½	4 9
Thickness of coal sampled.....	3 6	3 7⅞	3 2	3 4½	4 9

Section A (sample 26582) was cut at face of 14 left entry, main entry, just in by 35 room and 6,750 feet south 20° west from the drift mouth. Section B (sample 26583) was cut in the last cutthrough to the air course in 25 room, 200 feet off 15 left air course and 6,850 feet south 25° west from drift mouth. Section C (sample 26584) was cut in the face of 1 right entry, tunnel entry, and 2,250 feet south 2° east from the drift mouth. Section D (sample 26585) was cut from face of main entry, 400 feet in by 16 entry and 6,900 feet south 36° west from drift mouth. Section E (sample 26587) was cut from 14 room pillar of 13 entry, 150 feet from 13 entry and 5,900 feet south 24° west from drift mouth.

The ultimate analysis of a composite sample made by combining face samples 26582, 26583, 26584, and 26585 is given under laboratory No. 26586.

System of mining, room and pillar. In 1916 the coal was undercut by machine, and FFF black powder was used in shooting down the coal, also in brushing the roof or floor. Haulage underground was by electric locomotive and by mule. Carbide miner's lamps were used. At the time of sampling the output was 500 tons a day, of which the greater part was to be derived from advance workings. The actual daily capacity of the mine was said to be 800 tons. All of the coal was shipped as run of mine. Two pickers were employed on the cars. There was one loading track, with a capacity of 15 loaded and 25 to 30 empty cars. About 150 acres were still to be mined. The estimated lifetime of the mine was 12 to 15 years at the 1916 rate of output.

JENKINJONES. JENKINJONES No. 6 MINE.

Analyses 68096, 68090, 68083, and 30160; also car sample 30256 (p. 90). Semibituminous coal, Pocahontas field, from Jenkinjones No. 6 mine, a drift mine at Jenkinjones at the terminus of the Tug River branch of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 7 to 14 feet thick; roof, 1 to 6 inches "draw slate," then smooth black shale; floor, hard, gray shale. There is one persistent bone-coal parting 2 to 4 inches thick, which is partly picked out in the mine or on railroad cars. Commercial samples were taken at tidewater by N. H. Snyder on December 19 to 22, 1917. The bed was sampled by C. A. Allen on December 31, 1917, as described below:

Sections of coal bed in Jenkinjones No. 6 mine.

Section..... Laboratory No.....	A. 68083	B. 68096	C. 68090
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	9½	10	2 3
Coal, gray.....	1½	6	6
Coal.....	8½	8½	3
"Mother coal".....	½		
Bony coal.....		½	¾
Coal.....	1 5	9½	2¼
Bony coal.....	a 1	½	a 2
Coal.....	2	2 0	2 9
Bony coal.....	a 3	a 4	a 2½
Coal.....	5	8½	2 7½
Coal, gray.....	2		
"Mother coal".....		½	
Coal.....	1 10¼	1 10	
Bony coal.....	a ¼		
Coal, gray.....		1½	
Coal.....	2 9	3 3½	
Floor, shale.			
Thickness of bed.....	8 10	11 3	9 0
Thickness of coal sampled.....	8 5½	10 11	8 7½

a Not included in sample.

Section A (sample 68083) was cut in 29 room, 14 double entry. Section B (sample 68096) was cut on 19 pillar, M-13 entry. Section C (sample 68090) was cut at face of 3 room, H-10 entry. The ultimate analysis of a composite sample made by combining samples 68096, 68090, and 68083 is given under laboratory No. 30160.

This mine has three openings, with tracks leading to one tippie. The openings are called 6-1, 6-4, and 6-8.

System of mining, room and pillar, in panels. In 1917 the men employed numbered 125 underground and 15 on surface. The coal was cut by machine in coal above the floor and shot down with permissible explosives at any time during the shift by the miners. The miners used a pocket battery for firing the holes. The haulage was by two 15-ton electric motors and 11 gathering motors. Some pieces of roof and floor became mixed with the coal in shipping. There was a wooden tippie, with no cage. Electric power was bought from the railroad company. Impurities in the bed comprised bone streaks and "mother coal." About 45 per cent of the coal was taken in advance work, and a high recovery was made. All of the coal was shipped as run of mine and was picked on belt by seven pickers. There were no storage bins. The appearance of lump coal on cars was fair. There was one loading track, which had capacity for a large number of cars. The coal was dumped onto a plunger feeder, then onto a retarding conveyor, which took it down the hill, and then over bars about 4 inches apart, which took out sizes from egg to slack; these sizes were conveyed to the car by one conveyor. The oversize, or lump, passed over the screens to a second picking conveyor, on which seven pickers worked. From the picking belt the lumps joined the first coal just as it fell into the car. About 1,500 acres remained unmined, insuring long life to the mine. About three-quarters of the tonnage was from solid work. The maximum day's run was 2,000 tons and the average daily shipments at time of sampling, 1,350 tons.

For descriptions and analyses of other samples of this coal see Bureau of Mines Bull. 85, pp. 116, 355; and Bull. 123, pp. 122, 413.

JENKINJONES. JENKINJONES No. 7 MINE.

Analyses 67985, 67987, 68029, 68028, 68099, and 30170, and car sample 30244 (p. 90). Semibituminous coal, Pocahontas field, from Pocahontas (or Jenkinjones) No. 7 mine, a drift mine at Jenkinjones, at the terminus of the Tug River branch of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 6 to 14 feet thick, dip 2° west; roof, 2 inches "draw slate," above which is hard shale; floor, smooth, dark gray shale, soft in places. There is one persistent bone parting about 4 feet from floor. Rolls and horsebacks are frequent. Commercial samples were taken at tidewater by N. H. Snyder on January 14 to 28, 1918. The bed was sampled by C. A. Allen and S. P. Holt on December 29, 1917, as described below:

Sections of coal bed in Jenkinjones No. 7 mine.

Section.....	A. 68029	B. { 67987 68099 }	C. 67985
Laboratory No.....			
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	6	2 6	1 10½
"Sulphur" band.....	a1	a½	-----
Coal.....	1 10	1	-----
Bony coal.....	1½	a½	a 7½
Coal.....	1 3½	9	4 2
Bone.....	a2	a3	-----
Coal.....	4	1 3½	-----
"Mother coal".....	½	a½	-----
Coal.....	3½	6½	-----
Bone.....	¼	a1	-----
Coal.....	1 4	2 2½	-----
Bony coal.....	a2	-----	-----
Coal.....	1 4	-----	-----
"Rash".....	-----	a10	a7
Floor, shale.....	-----	-----	-----
Thickness of bed.....	7 6	8 7¾	7 3
Thickness of coal sampled.....	7 1	7 4½	6 ½

a Not included in sample.

Section A (sample 68029) was cut in dip entry near I cross entry. Section B (samples 67987 and 68099) was cut at face of 11 room, D-4, main entry. Section C (sample 67985) was cut at face of 1 room, 1 right air course.

Sample 68028 covers analysis of screened bone sample from same location as section A, the rejected portions of sample being picked down and screened through a half-inch screen. The oversize, taken as sample, showed 17.3 per cent ash.

The ultimate analysis of a composite sample made by combining face samples 67985, 67987, 68028, 68029, and 68099 is given under laboratory No. 30170.

System of mining, room and pillar. Coal was undercut by machine. Haulage was by electric motor around the side of the mountain to a 2,000-ton wooden tippie. The coal was all shipped as run of mine. It was picked on a belt by eight pickers as it passed to car conveyor. The company owns 20,000 acres of coal in the vicinity. The probable lifetime of the mine was many years. The capacity of the mine was 1,200 tons a day, and the average output in 1917 was 750 tons a day.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 123, pp. 122, 413.

JENKINJONES. JENKINJONES No. 8 MINE.

Analyses 68093, 68089, 68095, 68088, and 30172; also car sample 30239 (p. 90). Semi-bituminous coal, Pocahontas field, from Jenkinjones No. 8 mine, a drift mine, at Jenkinjones, at the terminus of the Tug Fork branch of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous age, Lower Pottsville series, Pocahontas formation. The bed is 5 to 14 feet thick and dips 10° northwest. Rolls or horsebacks are few. Roof, hard and smooth of black shale; floor, dark-gray shale, smooth and hard. Commercial samples were taken at tidewater by N. H. Snyder, on January 14 to 28, 1918. The bed was sampled by J. J. Bourquin on December 31, 1917, as described below:

Sections of coal bed in Jenkinjones No. 8 mine.

Section..... Laboratory No.....	A. 68093	B. 68089	C. 68095	D. 68088
Roof, hard shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, burned to roof.....	2 5½		2 9	3 3½
Coal.....		¾		
Coal, gray, bony.....	1½			
Coal, gray, too soft to leave.....	10	1 5½		
Coal.....	a 5	a 3	a 6	a 9½
Bone.....	2½	1 6	11	1 3
Coal.....	1½			
Coal, gray.....		a 1 1	a 5½	
Bony coal.....	9			
Bony coal.....		1 5	11	
Coal.....			a 3	
Bone.....			7	
Coal.....			a ¾	
Bone.....			9	
Coal.....				
Floor, shale.				
Thickness of bed.....	4 16¾	5 9	7 3½	5 3½
Thickness of coal sampled.....	4 5½	4 5	6 0	4 6½

^a Not included in sample.

Section A (sample 68093) was cut at face of G-4 heading. Section B (sample 68089) was cut at face of G-3 heading. Section C (sample 68095) was cut at face of 18 room, off G-2 entry, 7-1 mine, off 8. Section D (sample 68088) was cut at face of right air course, G triple entry.

The ultimate analysis of a composite sample made by combining face samples 68088, 68089, 68093, and 68095 is given under laboratory No. 30172.

System of mining, room and pillar. In 1917 the coal was cut by machine in the streak of bone about 3 feet from floor and was shot down by permissible explosive and

black powder. Haulage was by electric motors, there being one main line locomotive and seven gathering motors, using reel and cable. The tippie was wood. Practically all coal was shipped as run of mine, although about 60 per cent of the output was run through screens in order to facilitate picking. The slack was screened through 1½-inch openings in 12-foot bar screens. The egg, nut, and lump was picked on tables by eight pickers, and three pickers were employed on the slack. The coal was then reassembled as run of mine. The lumps varied in size from 3 or 4 inches up. There was one loading track, with capacity for 30 empty and 30 loaded railway cars. The probable life-time of the mine was 50 years, and the tonnage was to be mostly derived from advance work for some time. The average daily output of the mine at time of sampling was 3,000 tons, and the maximum day's run was 4,140 tons. This mine was sampled in 1914.

For description and analyses of other samples of coal from this mine, see Bureau of Mines Bull. 123, pp. 122, 413.

KIMBALL (VIVIAN). CARSWELL MINE.

Analyses 68033, 68034, 68035, and 30006; also car sample 30591 (p. 91). Semibituminous (?) coal, Pocahontas field, from Carswell mine, a shaft mine 2 miles from Kimball, on the Norfolk & Western R. R. Two seams are worked, Pocahontas Nos. 3 and 4, with an interval of 60 feet between them; Carboniferous (Pottsville) age, Pocahontas formation. Average thickness of bed is 4 to 5½ feet, with a persistent bone parting near the middle and a ½-inch band of "sulphur" above. Both beds are worked by the 300-foot shaft, No. 4 bed being 60 feet vertically above No. 3. Main roof, sandstone; immediate roof, 20 feet of clayey shale; floor, hard shale. Samples were collected from cars at tidewater by N. H. Snyder on January 28 to February 1, 1918. The No. 3 bed was sampled by J. W. Paul on December 29, 1917, as described below:

Sections of Pocahontas No. 3 coal bed in Carswell mine.

Section..... Laboratory No	A. 68034	B. 68035	C. 68033
Roof, "draw slate" and coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal with streaks of "mother coal".....	1 7½		
Coal.....		a 4½	2 0
Shale, clayey.....		a 7½	
Coal, with streaks of "mother coal".....		1 8½	
Bone.....	a 3	a 3½	a 3½
Coal.....	3 1½	8½	
Shale.....			a 10½
Coal, gray.....		1 3½	
Coal.....		1 3½	10½
Floor, not noted.			
Thickness of bed.....	5 0	6 3	4 ½
Thickness of coal sampled.....	4 9	5 0	2 10½

a Not included in sample.

Section A (sample 68034) was cut at face of 3 right, off main east, 400 feet from shaft. Section B (sample 68035) was cut at face of 4 left, 500 feet from main west. Section C (sample 68033) was cut at face of 3 right, 350 feet from main west.

The ultimate analysis of a composite sample made by combining samples 68033, 68034, and 68035 is shown under laboratory No. 30006.

System of mining, room and pillar, in panels. In 1917 the coal was undercut by machine in the bottom coal; pieces of the roof and floor became mixed with the coal in mining. About 30 per cent of coal was taken out in advance work. Men employed at time of sampling numbered 75 to 100 underground and 15 to 20 aboveground. The tippie was steel, with self-dumping cage. Haulage was by four electric and one storage-battery locomotive. The mine had five rooms turned off; all tonnage came from these rooms and the entries. The coal was shot down by permissible explosives,

which were fired by the miners at any time during shift. The coal was all shipped as run of mine and was picked on railroad cars by three pickers. There were no storage bins. There were four loading tracks, with capacity for 60 loaded and 60 empty cars. The cars were loaded from No. 3 bed, and the car sample represents six cars. There was a new steel tippie, with loading boom and picking tables, not in use at time of sampling. There were still about 1,000 acres to be worked. The estimated lifetime of the mine was 30 to 40 years. The capacity of the mine was 1,500 tons a day, and daily average output was 500 tons, which was to be increased.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 123, pp. 123, 417.

LICK BRANCH. DELTA MINE.

Analyses 67967, 67891, 67894, and 29911; also car sample 30260 (p. 91). Semi-bituminous coal, Pocahontas field, from Delta mine, a drift mine $\frac{1}{2}$ mile east of Lick Branch, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 6 to 8 feet thick; no faults, rolls, or horsebacks. Roof, very good, hard, smooth shale; floor, good, hard, smooth shale. A commercial sample was collected at tidewater by N. H. Snyder on December 19, 1917, to January 1, 1918. The mine was sampled by C. A. Allen on December 20, 1917, as described below:

Sections of coal bed in Delta mine.

Section..... Laboratory No.....	A. 67967	B. 67891	C. 67894
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 6	1 5	1 7
Bone.....	^a 4	^a 4	^a 1 $\frac{1}{2}$
Coal.....	3	2	3
Bony or gray coal.....	1 $\frac{1}{2}$	^a 1 $\frac{1}{2}$	^a 2
Coal.....	2 2	2 2	2 0
Bone.....	^a 3	^a 3 $\frac{1}{2}$	1
Coal.....	1 11 $\frac{1}{2}$	1 10	2 4 $\frac{1}{2}$
Floor, shale.			
Thickness of bed.....	6 7	6 4	6 7
Thickness of coal sampled.....	6 0	5 7	6 3 $\frac{1}{2}$

^a Not included in sample.

Section A (sample 67967) was taken from 8 room, 10-5 left entry. Section B (sample 67891) was taken from first left main heading, 300 feet from main entry. Section C (sample 67894) was taken from 2 room, 3 left cross entry.

The ultimate analysis of a composite sample made by combining samples 67967, 67981, and 67984 is given under laboratory No. 29911.

System of mining, room and pillar. In 1917 the coal was undercut by machine and shot down with black powder and permissible explosives by the miners during shift. The undercutting was done in the coal. Men employed numbered 75 underground and 24 aboveground. Impurities comprised considerable bone, gray coal, and "mother coal." The coal passed over bar screens with 1-inch openings and over shaking screens with $\frac{3}{4}$ -inch holes, and was dumped into a chute to a plunger feeder, which fed it over 1 $\frac{1}{2}$ -inch bars 10 feet long and 6 feet wide; the oversize went to a 4-foot picking conveyor, at which were 10 pickers. The undersize from bars passed over two 5 by 6 foot shaking screens with $\frac{3}{4}$ -inch holes and went directly to a 2 $\frac{1}{2}$ -foot picking conveyor, the oversize feeding on top of the undersize; four pickers worked on this conveyor. After being picked with care, all sizes were run into the car together. Track capacity was 30 loaded and 40 empty railroad cars. Haulage was by two 15-ton electric motor and five 6-ton gathering electric motors. About 45 per cent of the coal was taken out in advance work and the recovery was high. The

lease covers about 600 acres, and the estimated lifetime of the mine was 15 to 20 years. The daily average output of the mine at time of sampling was 1,300 tons; capacity, 1,350 tons.

MARYTOWN. MARYTOWN MINE.

Analyses 68002, 68003, and 29918, and tipple samples 70195 to 70198 (p. 314). Semibituminous coal, Pocahontas field, from Marytown mine, a drift mine at Marytown on the main line of the Norfolk & Western R. R. Coal bed, Sewell seam; Carboniferous (Pottsville) age, Sewell formation. Bed is 3 feet 4 inches to 4 feet 6 inches thick, with a shale parting; roof, hard, dark, sandy shale with smooth surface; floor, hard shale. Particles from the roof and floor did not become mixed with the coal in mining. Rolls and horsebacks are frequent. The vertical depth from surface to the coal was about 200 feet and over. Elevation of mine above sea level, about 1,300 feet. Commercial samples were taken at the tipple by J. J. Bourquin and S. S. Shirkey on September 17, 1918. The bed was sampled by G. H. Ashley on December 29, 1917, as described below:

Sections of coal bed in Marytown mine.

Section.....	A. 68003		B. 68002	
Laboratory No.....				
Roof, shale.	<i>Ft. in.</i>		<i>Ft. in.</i>	
Coal.....	3	1	3	1
Bone and shale.....	<i>a</i> 7		<i>a</i> 1	0
Coal.....	5		5	
Floor, slate.				
Thickness of bed.....	4	1	4	6
Thickness of coal sampled.....	3	6	3	6

a Not included in sample.

Section A (sample 68003) was cut in 4 crosscut, off 1 main. Section B (sample 68002) was cut in 6 crosscut, off 14 left.

An ultimate analysis of a composite sample made by combining face samples 68002 and 68003 is given under laboratory No. 29918.

System of mining, room and pillar. In 1917 the coal was undercut by machine. Cars were gathered by mules and hauled to head house by three 12-ton and two 8-ton electric locomotives. Coal was lowered to tipple, across railroad tracks and creek, by a conveyor. The coal was shot down during shifts with black powder and permissible explosive by the miners. The output was all being shipped as run of mine. The tipple was equipped with screens for 3½-inch lump, 2½-inch egg, and ¾-inch nut. The coal was picked on railroad car, one picker being employed. There were no storage bins. There were four loading tracks, with capacity for 35 empty and 30 loaded railroad cars. Future production was to come mostly from advance work. About 85 per cent recovery was claimed. The estimated life time of the mine was 15 years. Number of acres still unmined, 500. The daily average output of the mine in 1917 was 520 tons and the maximum day's run 1,100 tons.

For descriptions and analyses of other samples of coal from this mine see Bureau of Mines Bull. 22, pp. 264, 999.

McDOWELL. McDOWELL MINE.

Analyses 68006, 68007, 68010, and 29988; also car samples 68645 to 68646 (p. 91). Semibituminous coal, Pocahontas field, from McDowell mine, a drift mine 1 mile east of McDowell, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3, Carboniferous (Pottsville) age, Pocahontas formation. Bed is 4 feet 9 inches to 5 feet 9 inches thick; dip, northwest; roof, about 4 inches clayey shale over coal,

some "draw slate," and shale; floor, hard, smooth shale. Pieces from roof and floor have some tendency to become mixed with coal in shipping. Commercial samples were taken from cars at tidewater by N. H. Snyder on February 7 to 28, 1918. The bed was sampled by R. H. Seip on December 27, 1917, as described below:

Sections of coal bed in McDowell mine.

Section.....	A.	B.	C.
Laboratory No.....	68006	68007	68010
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	11 $\frac{1}{2}$	1 1 $\frac{1}{2}$	11 $\frac{1}{2}$
Bone.....	a 3	a 2	a 3 $\frac{1}{2}$
Coal.....	4 1 $\frac{1}{2}$	2 11	3 2 $\frac{1}{4}$
"Sulphur".....		a $\frac{1}{2}$	a 3 $\frac{1}{4}$
Coal.....		1 0	1 $\frac{3}{4}$
Floor, shale.			
Thickness of bed.....	5 4	5 3	5 6 $\frac{1}{2}$
Thickness of coal sampled.....	5 1	5 $\frac{1}{2}$	5 2 $\frac{1}{4}$

a Not included in sample.

Section A (sample 68006) was cut on 8 pillar, Spain heading, off Pennsylvania main. Section B (sample 68007) was cut at face of 8 room, off Bluefield heading, Ohio district. Section C (sample 68010) was cut at face of Egypt crossheading, off Germany main, Pennsylvania district.

The ultimate analysis of a composite sample made by combining face samples 68006, 68007, and 68010 is given under laboratory No. 29988.

System of mining, by panels. Thirty-five per cent of the coal was taken on the advance, and the balance by pillar-robbing; coal recovery claimed, 96 per cent. Men working numbered 112 underground and 70 aboveground, including coke ovens. Haulage was by three hauling motors, four gathering motors, and mules. The coal was cut by machine and by pick and shot down by FFFF black powder, permissible explosive being used for brushing. The bed carries a streak of bone about 3 feet from floor and varying streaks of "sulphur." Considerable picking on tables and on car was done by 12 pickers on tables and 8 on cars. About 40 per cent of the coal was shipped as run of mine. For large and nut sizes, 24-foot bar screens, with 3 $\frac{1}{2}$ to 4 inch spaces, and smaller screens, with 1 $\frac{1}{2}$ -inch and $\frac{1}{2}$ to $\frac{3}{4}$ inch openings, were used. The screenings were coked to the extent of 200 tons of coke a day. The storage bins had capacity for 500 tons slack. The lumps were large and of good appearance on cars. There were four loading tracks, with capacity for 45 empties and 85 loaded cars. Capacity of mine was 1,800 tons a day; average production in 1917 was 900 tons a day.

For descriptions and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 263, 997.

NEWHALL. BERWIND No. 6 MINE.

Analyses 68075, 68066, and 29981, and car sample 30235 (p. 92). Semibituminous coal, Pocahontas field, from Berwind No. 6 mine, a drift mine $\frac{1}{2}$ mile northwest of Newhall, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 5 to 6 feet thick; dip of bed, 3° to 4° northwest; roof, hard fire clay 4 $\frac{1}{2}$ to 6 feet thick, which disintegrated rapidly; floor, hard fire clay with smooth surface. Commercial samples were taken at tidewater by N. H. Snyder on February 1 to 21, 1918. The bed was sampled by R. H. Seip on January 3, 1918, as described below:

Sections of coal bed in Berwind No. 6 mine.

Section.....	A.	B.
Laboratory No.....	68075	68066
Roof, hard fire clay.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	4 0	4 0
Bone.....	a 3	a 2
Coal.....	11	7
Bone.....	a 3	a 3
Coal.....	a 7	a 6
Floor, fire clay.		
Thickness of seam.....	6 0	5 6
Thickness of coal sampled.....	4 11	4 7

a Not included in sample.

Section A (sample 68075) was cut at face of 1 left. Section B (sample 68066) was cut at face of 1 right.

The ultimate analysis of a composite sample made by combining face samples 68075 and 68066 is given under laboratory No. 29981.

System of mining, room and pillar. In 1918 the coal was undercut by machine and shot down during shifts by FFF black powder and permissible explosive by the miners. The mouth of the mine is 1,577 feet above sea level. Men employed numbered 50 underground and 12 on the surface. Haulage was by five motors. The recovery claimed was about 95 per cent of the total coal in bed. There were 6,000 acres still unmined, and the lifetime was estimated at 25 years. The coal was all shipped as run of mine. Three pickers were employed on cars. There were two loading tracks, with capacity for 100 empty and 70 loaded railroad cars. The bottom coal was loaded out separately and sent to a washery. The capacity of the mine was 600 tons a day, and the average production at time of sampling was 450 tons a day, which was to be increased rapidly.

NEWHALL. BERWIND NO. 7 MINE.

Analyses 68146, 68148, 68164, and 30168 and car sample 30259 (p. 92). Semibituminous coal, Pocahontas field, from Berwind No. 7 mine, a drift mine $\frac{1}{4}$ mile southeast of Newhall, on the Dry Fork branch of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Potsville) age, Pocahontas formation. Bed is 5 to 6 feet thick and dips 4° northwest. No faults, rolls, or horsebacks were encountered. Roof, "draw slate," then sandy shale; floor, shale. Near top of seam was a persistent band of "rash" or slightly bony coal, averaging about 6 inches wide, and near bottom was a persistent streak of bone; in places the bed contained a still lower streak of bone. Pieces from roof and floor become mixed with the coal in shipping. Commercial samples were taken at tidewater by N. H. Snyder on December 19 to 20, 1917. The bed was sampled by C. A. Allen on January 3, 1918, as described below:

Sections of coal bed in Berwind No. 7 mine.

Section.....	A.	B.	C.
Laboratory No.....	68148	68146	68164
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3	2	
"Rash" or slightly bony coal.....	4	4	a 6
Coal.....	1 6	4 0	1 8
Coal, gray.....	1½		1½
Coal.....	2 3½		2 2½
Bone.....	a 4	a 4½	a 4
Coal, slightly bony.....	3		
Coal.....	10	10½	4
Bone.....	a 1		
Bottom coal.....	a 6	a 5	4
Floor, shale.			
Thickness of bed.....	6 6	6 2	5 6
Thickness of coal sampled.....	5 7	5 4½	4 8

a Not included in sample.

Section A (sample 68148) was cut in 11 room neck, 2 left. Section B (sample 68146) was cut in main entry, 12 feet beyond 5 right. Section C (sample 68164) was cut in 3 right, opposite 12 room.

The ultimate analysis of a composite sample made by combining face samples 68146, 68148, and 68164 is given under laboratory No. 30168.

System of mining, room and pillar. In 1918 the coal was cut by machine in the bottom coal and shot down during shift with permissible explosives and a little black powder by the miners. Men employed numbered 75 underground and 10 on the surface. Haulage was by one 18-ton motor and four 6-ton motors. There was a steel tippie. In some places just above the coal is black "draw slate," which is difficult to separate. The bottom 6 inches of coal was higher in ash, and as it was cut by machine the cuttings were loaded out and sent to washery at No. 1 mine. Shale and some bone was discarded by miners; if a car had much impurity it was sent to washery. The coal was all shipped as run of mine, except screenings, which were sent to washery and coked. Fifty tons of coke were produced daily. There were two tracks, with capacity for 30 or more empty and 20 loaded railroad cars. The appearance of the coal on cars was fair. The mine had a large acreage still unmined. About 40 per cent of the coal was taken out in advance work. One-quarter of the tonnage was coming from pillars. The capacity of the mine was 750 tons a day; average shipments at time of sampling, 500 tons a day.

NEWHALL. BERWIND No. 8 MINE.

Analyses 68071, 68078, 68079, and 29977 and car sample 30262 (p. 92). Semibituminous coal, Pocahontas field, from Berwind No. 8 mine, a drift mine $1\frac{1}{2}$ miles east of Newhall, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 5 to 6 feet thick; roof, 3 inches of fire clay, 6 feet of "draw slate," and sandstone; floor, clay and shale. Commercial samples were taken at tidewater by N. H. Snyder on February 11 to 27, 1918. The bed was sampled by S. P. Holt on January 3, 1918, as described below:

Sections of coal bed in Berwind No. 8 mine.

Section.....	A. 68079	B. 68078	C. 68071
Laboratory No.....			
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	7 $\frac{1}{2}$	4 6 $\frac{1}{2}$	4 3 $\frac{1}{2}$
"Mother coal".....	6 $\frac{1}{2}$		
Coal.....	3 6 $\frac{1}{4}$		
Bone.....	a 3	a 2	a 3
Coal.....	9	8	11
Floor, clay.			
Thickness of bed.....	5 2	5 4 $\frac{1}{2}$	5 5 $\frac{1}{2}$
Thickness of coal sampled.....	4 11	5 2 $\frac{1}{2}$	5 2 $\frac{1}{2}$

a Not included in sample.

Section A (sample 68079) was cut at face of main heading. Section B (sample 68078) was cut at face of 3 right. Section C (sample 68071) was cut at face of 1 right.

The ultimate analysis of a composite sample made by combining face samples 68071, 68078, and 68079 is given under laboratory No. 29977.

In 1918 the capacity of the mine was 300 tons a day, and the actual average at time of sampling was 250 tons. It was expected to increase the output to 400 tons a day. Men employed numbered 52 underground and 11 aboveground. Two coal-cutting machines were employed, and four electric locomotives. The coal was all shipped as run of mine. The coal was picked on cars by three pickers. The storage bins had capacity for 40 tons. There was one loading track, with capacity for 30 empty and 47 loaded cars.

RODERFIELD. PREMIER POCAHONTAS NOS. 1, 2, AND 3 MINES.

Analyses car samples 69658, 69659, 69492, 69493, 69020, and 69021 (p. 93). Bituminous coal, Pocahontas field, from Premier Pocahontas mines Nos. 1, 2, and 3, drift mines close to each other, near Roderfield, on a branch of the Norfolk & Western R. R. Coal beds; Welch and Sewell; Carboniferous (Pottsville) age, Sewell formation. Car samples were taken at tidewater by H. W. Jarrett and N. H. Snyder on February 21 to July 3, 1918; June 6 to 19, 1918, and February 18 to April 11, 1918.

RODERFIELD. PREMIER POCAHONTAS NO. 4 MINE.

Analyses 70223 and 70224, average of face samples; analyses 70225 to 70228, average of tipple samples, and analysis 30590, car sample (p. 93). Semibituminous coal, Pocahontas field, from Premier No. 4 mine, a drift mine 5 miles east of Roderfield, on the Norfolk & Western R. R. Coal bed, Welch, or No. 6; Carboniferous (Pottsville) age, Sewell formation. Bed is 3 feet 2 inches to 5 feet thick; dip, north 35° west to northwest; roof, hard, black shale; no "draw slate"; floor, hard, smooth black shale. The bed was sampled by S. S. Shirkey on September 20, 1918, as described below. Tipple samples were taken at car loading by J. J. Bourquin on September 20, 1918. Car samples were taken at tidewater by N. H. Snyder on January 15 to February 18, 1918.

Sections of coal bed in Premier No. 4 mine.

Section.....	A.	B.
Laboratory No.....	70224	70223
Roof, hard, black shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, soft.....	11	1 0
Coal, hard.....	3	3
Coal, soft.....	2 2	2 7
Floor, hard, black shale.		
Thickness of bed.....	3 4	3 10
Thickness of coal sampled.....	3 4	3 10

Section A (sample 70224) was cut from face of 1 left entry, 1 right entry, 2,300 feet from main opening. Section B (sample 70223) was cut from face of 3 left air course, 4,400 feet from main opening.

The mine is opened on the panel system. In 1918 the coal was undercut with pick and shot down at any time during the shift with black powder by the miners. Men employed, 40 underground and 7 aboveground. The coal was dumped over a wooden tipple; none of it was shipped as run of mine. About 65 per cent of it passed through bar screens having 3¼-inch openings; sizes above this were recombined in loading. Haulage was by two electric locomotives. The coal was cleaned on the railroad cars by four pickers. There were two loading tracks, with capacity for 22 empty and 22 loaded railroad cars. The coal as loaded on the cars was very clean. About 50 per cent of the coal was taken out in the advance work, and the total recovery claimed was 95 per cent. The unmined area consisted of 800 acres. The estimated lifetime of the mine was 40 years. The capacity of the mine at time of sampling was 750 tons a day, and the average daily output was 350 tons. The coal was being shipped to tidewater coal exchange and used for steam purposes.

For descriptions and analyses of other samples of this coal see Bureau of Mines Bull. 22, pp. 267, 1007, 1008.

TWIN BRANCH. J. B. B. (OR MAHER) MINES NOS. 1, 2, 3, 4, AND 5.

Analyses 29681, 68001, 68004, 67997, 67999, 67998, and 29919; also car samples 69039, 69040, 68905, 68906, and 30243 and average of tipple samples 70275 to 70278 (p. 93). Semibituminous coal, Pocahontas field, from J. B. B. (or Maher) group of five adjacent

mines, drift mines, about 1 mile north of Twin Branch post office, on a branch line of the Norfolk & Western R. R. Coal bed, Sewell; Carboniferous (Pottsville) age, Sewell formation. Bed is 2 to 3½ feet thick; dip, 2 per cent northwest; roof, hard, black shale; floor, hard, shaly underclay with smooth surface. The bed was sampled by G. H. Ashley on December 27, 1917, as described below. Car samples were taken by N. H. Snyder on January 14 to February 1, 1918; February 7 to April 2, 1918, and March 5 to April 22, 1918. Tipple samples were taken by S. S. Shirkey on September 23, 1918.

Sections of coal bed in J. B. B. (or Maher) mines.

Mine No.	1 A. 68001	2 B. 68004	3 C. 29681	4 D. 67998	5 E. 67999	6 F. 67997
Section.....						
Laboratory No.....						
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 3	2 2	3 2	3 6	3 2	3 6
Floor, clay.						
Thickness of bed.....	3 3	2 2	3 2	3 6	3 2	3 6
Thickness of coal sampled.....	3 3	2 2	3 2	3 6	3 2	3 6

Section A (sample 68001) was taken from No. 1 mine, in 4 northwest entry. Section B (sample 68004) was cut in No. 2 mine, in 3 right entry, left, off 2 main. Section C (sample 29681) was cut in No. 3 mine, in 2 right, off 4 main. Section D (sample 67998) was cut in No. 4 mine, in 5 room, 3 left, 13 right. Section E (sample 67999) was cut in No. 4 mine, in 13 left, off straight entry. Section F (sample 67997) was cut in No. 5 mine, in 3 right, off main.

The ultimate analysis of a composite sample made by combining face samples 68001, 68004, 67997, 67998, 67999, and 29681 is given under laboratory No. 29919.

System of mining, room and pillar. In 1917 open carbide lamps were used. Haulage was by mules and electric motors. The mines were moist. The coal was brought down by black powder and shot by the miners during the shift; permissible explosive was used in brushing roof. The coal was undercut by machine in streak of bony coal near bottom of seam. Some of the roof and floor became mixed with the coal in shipping. About 45 per cent of the coal was taken out in advance work, and a total recovery of 80 to 95 per cent was claimed. There were about 4,000 to 5,000 acres yet to be mined, and the estimated lifetime of the mine was 18 years. At the time of sampling a large portion of the coal was being derived from pillars. The maximum day's run was 2,000 tons, and the capacity was from 1,200 to 1,400 tons a day. About 30 per cent of the output was shipped as run of mine, and the remainder was screened through 4-inch, 2-inch, and 1-inch holes. The appearance of the coal on cars was good and clean; the lumps were moderately large. The track capacity was 65 empty and 65 loaded railroad cars.

For descriptions and analyses of other samples from No. 2 mine, see Bureau of Mines Bull. 22, pp. 270, 1013, and from No. 4 mine see Bureau of Mines Bull. 123, pp. 123, 415.

VIVIAN. KING MINE.

Analyses 68024, 68025, 68027, 68030, and 29974 and car sample 30261 (p. 94). Semi-bituminous coal, Pocahontas field, from King mine, a slope mine at Kimball station, near Vivian, on the Norfolk & Western R. R., on Laurel Creek, 9½ miles from Welch and ½ mile west of West Vivian. Coal beds, Pocahontas Nos. 3 and 4; Carboniferous (Pottsville) age, Pocahontas formation. Between the beds is an interval of 85 feet. No. 4 bed had just been opened and no samples were taken from it. Thickness of No. 3 bed, 5 to 5½ feet; No. 4 bed, 4 feet. Dip of both beds is west. The mine is gaseous. Roof, 4 to 9 inches "draw slate," 1 to 2 inches coal, 6 to 18 inches black shale; floor, hard shale with smooth surface. Some particles from the floor became

mixed with the coal in mining. Depth from surface at point where samples were taken, about 1,300 feet. Commercial samples were taken at tidewater on February 6 to March 5, 1918, by N. H. Snyder. The bed was sampled by C. A. Allen on December 26, 1917, as described below:

Sections of Pocahontas No. 3, coal bed in King mine.

Section..... Laboratory No.....	A. 68030	B. 68024	C. 68025
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 9	4	1 3½
Bone.....	a 3		
"Mother coal".....		½	
Coal, slightly bony.....			1½
Coal.....	3 3	1 3	3 1
Bone.....		a 2½	
Coal.....		1 10	
"Mother coal".....		½	
Coal.....		½	
"Mother coal".....		½	
Coal.....		1 4	
Floor, shale.			
Thickness of bed.....	5 3	5 1	4 11
Thickness of coal sampled.....	5 0	4 10½	4 11

a Not included in sample.

Section A (sample 68030) was cut in 9 room, 9 cross entry, off main. Section B (sample 68024) was cut in 6 north, at 12 heading. Section C (sample 68025) was cut at face of 5 room, 8 cross entry. Sample 68027 was a sample of bone coal picked out of streaks from sections A and B.

The ultimate analysis of a composite sample made by combining samples 68024, 68025, 68027, and 68030 is given under laboratory No. 29974.

System of mining, room and pillar. In 1917 the coal was shot down with black powder by shot firers during the shift; holes might be loaded by the miner. The coal was undercut by machine and by hand. Haulage was by mule, electric motors, and two 15-ton and two 5-ton locomotives. There were 300 men employed underground and 40 aboveground. At the wooden tippie the coal was elevated by a 6-foot conveyor and discharged over two chutes 6 feet wide. One of these had ¾-inch spaced bars for taking out slack, which was shipped without further grading. When making fully prepared sizes, 4-inch spaced bars were placed in the bottom of the chutes, the oversize going over a picking belt to the railroad car and the undersize going over two 6 by 16 foot shaking bar screens. The top screen, for egg coal, had 1½-inch spaces, and the bottom screen, for nut, had 1-inch spaces. When making prepared sizes, four men picked from egg coal, two from lump coal, and five on the cars. The inside conditions were good, but 4 to 6 inches of "draw slate," and sometimes a second layer of 9 to 18 inches, falls. The storage-bin capacity was 600 tons run of mine, 150 tons nut, and 150 tons egg size. The lumps were small. There were two loading tracks, having capacity for 31 empty and 46 loaded railroad cars. About 1,500 acres were still to be mined, and the estimated lifetime of the mine was 40 years. Half the future tonnage was to come from advance work and half from pillars. Capacity of the mine was 1,500 tons a day, and the average production in 1917 was 650 to 750 tons a day.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 271, 1016.

VIVIAN. TIDEWATER MINE.

Analyses 68005, 68009, 68008, and 29914; also car sample 30236 (p. 94). Semi-bituminous coal, Pocahontas field, from Tidewater mine, a drift mine at Vivian, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville)

age, Pocahontas formation. Bed is $4\frac{1}{2}$ to $5\frac{1}{2}$ feet thick; roof, black shale and "draw slate" 8 to 10 inches thick, with cap rock of sandstone; floor, smooth, of massive, hard blue shale. A commercial sample was taken on the cars by N. H. Snyder on February 23, 1918. The bed was sampled by R. H. Seip on December 26, 1917, as described below:

Sections of coal bed in Tidewater mine.

Section..... Laboratory No.....	A. 68005	B. 68008	C. 68009
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	10	2	1 7 $\frac{1}{2}$
"Mother coal".....	$\frac{3}{4}$		
"Sulphur".....		$a \frac{1}{2}$	
Bone.....			a 2
Coal.....	9	1 7	
Shale.....			a 1
Bone.....	a 3	a 4	
Coal.....	3	2 11	3 4 $\frac{1}{2}$
"Mother coal".....	$\frac{1}{2}$		
Coal.....	2 5 $\frac{1}{2}$		
Floor, shale.			
Thickness of bed.....	4 7 $\frac{1}{2}$	5 $\frac{1}{2}$	5 3
Thickness of coal sampled.....	4 4 $\frac{1}{2}$	4 8	5 0

^a Not included in sample.

Section A (sample 68005) was cut at face of main heading, at 23 cross entry. Section B (sample 68008) was cut from 5 pillar, 12 cross entry, 6 north. Section C (sample 68009) was cut at face of 26 room, 11 cross entry.

The ultimate analysis of a composite sample made by combining face samples 68005, 68008, and 68009 is given under laboratory No. 29914.

System of mining, room and pillar. In 1917 the coal was undercut by short-wall machines and shot down by FFF black powder by the miners during shift. There were 170 men employed underground and 25 on the surface. Haulage was by mule and electric locomotives, one main and three gathering. There was a persistent streak of bone 3 feet from floor, which the miners endeavored to pick out, also a few other streaks. In advance work 30 per cent of the coal was taken out and there was a total recovery of 95 per cent. All of the coal was shipped as run of mine. It was picked on belt and car by six pickers. There was one loading track, with capacity for 35 empty and 30 loaded cars. In December, 1917, 2,000 tons were turned over to the railroad, 3,150 tons sent to the Government at Lambert Point, Va., and the remainder was shipped to Indiana Harbor for use in by-product coke ovens. The capacity of the mine was 700 tons a day, and the daily average at time of sampling was 500 tons.

For descriptions and analyses of other samples from this mine see Bureau of Mines Bull. 22, pp. 271, 1015.

MARION COUNTY.

CHIEFTON. CONSOLIDATION No. 47 MINE.

Analyses 28570 to 28576 (p. 94). Bituminous coal, Fairmont field, from Consolidation No. 47 mine, a drift mine 1 mile from Chiefton, on the Baltimore & Ohio R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Bed is $5\frac{1}{2}$ feet to $7\frac{1}{2}$ feet thick; the coal outcrops at about water level. A few faults and one roll are encountered. The bed was sampled by E. H. Denny on June 2, 1917, as described below:

Sections of coal bed in Consolidation No. 47 mine.

Section..... Laboratory No.....	A. 28570	B. 28571	C. 28572	D. 28573	E. 28574	F. 28575
Roof, "draw slate" and coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 1 $\frac{1}{4}$	1 1 $\frac{1}{2}$	2 1 $\frac{1}{4}$	1 7	1 3	2
Shale.....	1	a 1 $\frac{1}{2}$	a 1	a 1	a 1 $\frac{1}{2}$	a 1
Coal.....	3	3 $\frac{1}{4}$	3	3 $\frac{1}{4}$	2 $\frac{3}{4}$	3 $\frac{1}{4}$
Shale.....	3 $\frac{1}{2}$	a 1 $\frac{1}{2}$	a 3 $\frac{1}{4}$	a 3 $\frac{1}{4}$	a 3 $\frac{1}{4}$	a 3 $\frac{1}{4}$
Coal.....	1	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	2 $\frac{1}{2}$	3
Shale.....	4 2	a 1 $\frac{1}{4}$	a 1	a 1	a 1 $\frac{1}{2}$	a 1
Coal.....		8 $\frac{3}{4}$	4 2	4 2 $\frac{1}{2}$	2 2	4 2
"Sulphur," local.....		a 1 $\frac{1}{4}$			a 1	
Coal.....		3 4			1 8 $\frac{1}{2}$	
Floor, fire clay.						
Thickness of bed.....	7 1 $\frac{1}{2}$	6 1 $\frac{1}{4}$	7 1 $\frac{1}{2}$	6 7	5 11 $\frac{1}{2}$	6 11 $\frac{1}{2}$
Thickness of coal sampled.....	7 1 $\frac{1}{2}$	5 9 $\frac{1}{4}$	6 9 $\frac{1}{4}$	6 4 $\frac{1}{2}$	5 7 $\frac{1}{2}$	6 9 $\frac{1}{2}$

a Not included in sample.

Section A (sample 28570) was cut from 16 room, pillar 4 right, off main south. Section B (sample 28571) was cut from 9 room, pillar 3 right, 4 south. Section C (sample 28572) was cut from 16 room, pillar 4 right, off main south. Section D (sample 28573) was cut from 5 south, just inby 6 right. Section E (sample 28574) was cut from 22 room, 1 left, 5 south. Section F (sample 28575) was cut from 3 room, 10 left, main south face heading.

Ultimate analysis of a composite sample made by combining samples 28571 to 28575 is given under laboratory No. 28576.

System of mining, room and pillar, in panels, most of the output, however, being derived from pillars. In 1917 the coal was undercut by machine and shot down with permissible explosive by the miners at any time during the shift, one shot firer being employed to assist inexperienced men. There were 98 men employed underground and 20 above ground. Haulage was by mule and by three electric locomotives. The coal was dumped over a wooden tippie, about half the output being shipped as run of mine. The coal was screened through shaking screens having 1 $\frac{1}{2}$ and $\frac{3}{4}$ inch openings. Three pickers were employed to clean the coal on the railroad cars. The three loading tracks had capacity for 30 loaded and 35 empty railroad cars. In 1917 the estimated lifetime of the mine was 20 years. The capacity was 1,500 tons a day, and the actual daily average was 600 tons.

FAIRMONT. CONSOLIDATION NO. 38 MINE.

Analyses 28106 to 28111 (p. 94). Bituminous coal, Fairmont field, from Consolidation No. 38 mine, a shaft mine 1 mile north of Fairmont, on the Baltimore & Ohio R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Bed is 7 feet to 8 feet thick; dip, 2 per cent north, with cleat running in same direction. No faults, rolls, or horsebacks were encountered in mining, but the bed had three shale partings near the middle. Roof, 6 to 9 inches of roof coal, above which is tender "draw slate"; floor, hard, rather smooth, of fire clay. The bed was sampled by E. H. Denny on April 23, 1917, as described below:

Sections of coal bed in Consolidation No. 38 mine.

Section..... Laboratory No.....	A. 28106	B. 28107	C. 28108	D. 28109	E. 28111
Roof, coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 4	1 11	2 7 $\frac{1}{2}$	2	2 3
Shale.....	a 3 $\frac{3}{4}$	a 1 $\frac{1}{2}$	a 1	a 3 $\frac{3}{4}$	a 1
Coal.....	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3
Shale.....	a 3 $\frac{1}{2}$	a 3 $\frac{3}{4}$	a 3 $\frac{1}{4}$	a 1	a 1
Coal.....	2 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3	3
Shale.....	a 2	a 1	a 3 $\frac{1}{2}$	a 3 $\frac{1}{2}$	a 3 $\frac{1}{2}$
Coal.....	4 6	4 7 $\frac{1}{2}$	4 7	4 10	3 3
"Sulphur".....					a 3 $\frac{1}{2}$
Coal.....					1 3
Floor, fire clay.					
Thickness of bed.....	7 6 $\frac{1}{4}$	7 13 $\frac{1}{4}$	7 10 $\frac{3}{8}$	7 6 $\frac{1}{4}$	7 6 $\frac{1}{4}$
Thickness of coal sampled.....	7 3	6 11 $\frac{1}{2}$	7 8 $\frac{3}{8}$	7 4 $\frac{1}{2}$	7 3 $\frac{3}{8}$

a Not included in sample.

Section A (sample 28106) was taken from face, main butt, off main north heading. Section B (sample 28107) was taken from face 9 right, off main north heading. Section C (sample 28108) was taken from face 4 room, 1 left, 3 left level, off main dip heading. Section D (sample 28109) was taken from face room 2, 1 right, 3 north, off main dip entry. Section E (sample 28111) was taken in 2 cut-through between rooms 3 and 4, 8 right, 2 left heading, off main dip entry (pillar coal).

The ultimate analysis of a composite sample made by combining face samples 28106, 28107, 28108, and 21809 is given under laboratory No. 28110.

System of mining, room and pillar, in panels. In 1917 the coal was cut by machine and shot down with permissible explosive by contractors at any time of the day. There were 135 men employed underground and 40 aboveground. The coal was dumped over a wooden tipple in self-dumping steel cages, all coal being shipped as run of mine. Nut and lump coal over $\frac{3}{4}$ -inch passed through screens. Haulage was by mules and electric locomotives. The coal was cleaned on the railroad cars by four pickers. There were two loading tracks, with capacity for 20 empty and 20 loaded railroad cars. There was much large lump in the coal on the cars. In 1917 estimated lifetime of the mine was 40 years. The capacity was 1,500 tons a day, and the daily average was 800 tons.

FARMINGTON. CONSOLIDATION NO. 87 MINE.

Analyses 28505 to 28509 (p. 95). Bituminous coal, Fairmont field, from Consolidation No. 87 mine, a shaft mine, 1 mile from Farmington, on the Western Maryland R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Bed is 6 to 7 feet thick. Occasional rolls or horsebacks are encountered but no faults. Bed carried three bands of shale and occasional "sulphur" bands and bails and "clay veins." Roof, roof coal from 3 to 12 inches, being left up as roof and arched; floor, smooth, fairly hard fire clay. The bed was sampled by E. H. Denny on May 22, 1917, as described below:

Sections of coal bed in Consolidation No. 87 mine.

Section..... Laboratory No.....	A. 28505	B. 28506	C. 28507	D. 28508
Roof, coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	9	1 4	1 2	5 $\frac{1}{4}$
"Sulphur" band.....				$\frac{1}{4}$
Shale band.....	$a \frac{3}{4}$	$a 1$	$a \frac{3}{4}$	
Coal.....	3	2	4	1 0
Shale band.....	$a \frac{3}{4}$	$a \frac{3}{4}$	$a \frac{3}{4}$	$a 1\frac{1}{2}$
Coal.....	4 $\frac{1}{2}$	3	2 $\frac{1}{4}$	2
Shale band.....	$a 1$	$a 1$	$a 1$	$a 1$
Coal.....	3 1	1 10 $\frac{1}{4}$	3	3
"Sulphur" band.....	$\frac{1}{4}$	$\frac{1}{4}$		
Shale band.....			$a 1$	$a 1$
Coal.....	2 0	2 5	4 $\frac{1}{2}$	3 1
"Sulphur" band.....				$\frac{1}{4}$
Coal.....				5
"Sulphur" band.....				$\frac{1}{4}$
Coal.....				9 $\frac{1}{2}$
Floor, fire clay.				
Thickness of bed.....	6 8 $\frac{1}{4}$	6 5 $\frac{1}{4}$	6 3 $\frac{1}{4}$	6 6 $\frac{1}{2}$
Thickness of coal sampled.....	6 5 $\frac{3}{4}$	6 2 $\frac{3}{4}$	5 11 $\frac{1}{4}$	6 3

^a Not included in sample.

Section A (sample 28505) was taken at 3 right, off the back switch. Section B (sample 28506) was taken at southeast side of mine, loaded haulage way, main heading, about 1,600 feet from shaft bottom. Section C (sample 28507) was cut from 1 heading of 2 right ("No. 1 top right"). Section D (sample 28608) was taken from last crosscut between 2 and 3 left, off back switch.

The ultimate analysis of a composite sample made by combining samples 28505 to 28508 is given under laboratory No. 28509.

System of mining, room and panel. In 1917 the coal was undercut by machine and shot down with permissible explosive at any time during the shift by four shot firers. The coal was dumped over a steel tippie, all the coal being shipped as run of mine. Haulage was by four storage-battery locomotives and by mules.

HUTCHINSON. CONSOLIDATION No. 84 MINE.

Analyses 28432 to 28435, 28469 to 28470, and 28440 (p. 95): Bituminous coal, Fairmont field, from Consolidation No. 84 mine, a slope mine, at Hutchinson, on the Baltimore & Ohio R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Bed, 6 to 7 feet thick. The bed contains three bands of shale and occasional "sulphur" bands and balls. Roof, 4 to 12 inches of roof coal left, well arched; floor, hard, smooth fire clay. The bed was sampled by E. H. Denny on May 18, 1917, as described below:

Sections of coal bed in Consolidation No. 84 mine.

Section..... Laboratory No.....	A. 28432	B. 28433	C. 28434	D. 28435	E. 28469	F. 28470
Roof, coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	5	1 4	1 3	1 8½	1 8	1 5
"Sulphur" band.....	¼					
Shale band.....		a 1	a 1¼	a 1¾	a ¾	
Shale, soft, brittle.....						b ¾
Coal.....	1 2½	2	3	2	2½	2½
Shale band.....	b ½	a 1	a 1	a ¾	a 1	a 1½
Coal.....	2	3½	3½	3½	3½	2½
Shale band.....	a 1¼	a 1¾	a 1¼	a 1½	a 1½	a 1
Coal.....	3½	2 10½	2 8	2 8	4 5	4 2
Shale band.....	a ¾					
"Sulphur" band.....			⅛	⅛		
"Sulphur" ball.....		a 1½				
Coal.....	4 4	1 5	1 5	1 7		
Floor, fire clay.						
Thickness of bed.....	6 7¾	6 6¼	6 2¾	6 9¼	6 10	6 3
Thickness of coal sampled.....	6 5¼	6 1	5 10¾	6 5¾	6 7	6 0

a Not included in sample.

b Included in sample.

Section A (sample 28432) was cut near face of 7 left entry, opposite 5 room neck, 3 south-face heading. Section B (sample 28433) was cut in 4 room neck, 7 right entry, 2 north face. Section C (sample 28434) was cut in 12 room neck, 8 left entry, 2 south face. Section D (sample 28435) was cut in 7 room, crosscut 2 right, 2 north face pillar. Section E (sample 28469) was cut near face of air course of 4 south. Section F (sample 28470) was cut at face of main-entry manway.

The ultimate analysis of a composite sample made by combining samples 28432, 28433, 28434, 28435, 28469, and 28470 is given under laboratory No. 28440.

System of mining, room and panel. In 1917 the coal was undercut by machine and shot down with permissible explosive, the shots being fired electrically by battery at any time during the shift by the shot firers. There were 110 men employed underground and 10 aboveground. Haulage was by three electric locomotives and by mule. There were four loading tracks, with capacity for 70 empty and 75 or more loaded railroad cars. None of the coal was shipped as run of mine. The coal was passed through screens having ¾ and 1½-inch openings and was cleaned on the cars by four pickers. The coal on the cars showed many large lumps. The capacity of the mine was 1,600 to 1,800 tons a day, and the actual daily average was 1,000 to 1,200 tons.

MONONGAH. CONSOLIDATION No. 43 MINE.

Analyses 28209 to 28212 and 28225 to 28227 (p. 95). Bituminous coal, Fairmont field, from Consolidation No. 43 mine, a slope mine at Monongah, on the Baltimore & Ohio R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Bed is 7 to 8 feet thick; dip, 2 per cent north, with cleat running north. The bed contains three partings. No faults, rolls, or horsebacks are encountered. Roof,

roof coal, 6 to 9 inches being left, and "draw slate"; floor, rather hard, smooth fire clay. The bed was sampled by E. H. Denny on May 3, 1917, as described below:

Sections of coal bed in Consolidation No. 43 mine.

Section..... Laboratory No.....	A. 28209	B. 28210	C. 28225	D. 28226	E. 28227	F. 28211
Roof, coal.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 6 $\frac{1}{2}$	2 1 $\frac{1}{2}$	2 0	2 1 $\frac{1}{2}$	1 6	2 1
Shale band.....	a 1	a 1	a 1	a 1 $\frac{1}{2}$	a 1 $\frac{3}{4}$	a 1 $\frac{3}{4}$
Coal.....	2 $\frac{1}{4}$	2	2 $\frac{3}{4}$	2	3	2
Shale band.....	a 1	a 1	a 1 $\frac{3}{4}$	a 1 $\frac{1}{2}$	a 1	a 1
Coal.....	3	3	3 $\frac{1}{2}$	3 $\frac{1}{2}$	4	3
Shale band.....	a 1 $\frac{1}{4}$	a 1 $\frac{1}{2}$	a 1	a 1	a 2	a 1 $\frac{1}{4}$
Coal.....	4 5	4 4	4 3	4 5	5 0	4 6
Floor, fire clay.						
Thickness of bed.....	7 8	7 1	7 0	7 2 $\frac{1}{4}$	7 5 $\frac{3}{4}$	7 3
Thickness of coal sampled.....	7 4 $\frac{3}{4}$	6 9 $\frac{1}{2}$	6 9 $\frac{1}{4}$	7 0	7 1	7 0

a Not included in sample.

Section A (sample 28209) was cut from face 11 room, off 6 butt, off 4 north. Section B (sample 28210) was cut from pillar, 5 room, 4 left, on 5 south. Section C (sample 28211) was cut from face of air course 2 right, off 5 north. Section D (sample 28225) was cut from 4 room, pillar 2 right, 4 south. Section E (sample 28226) was cut from face main, right butt, off 3 north, 1,400 feet from 3 north. Section F (sample 28227) was cut from barrier pillar between room 10 and 11, 2 right.

The ultimate analysis of a composite sample made by mixing samples 28209, 28210, 28211, 28225, 28226, and 28227 is given under laboratory No. 28212.

System of mining, room and pillar in panels. In 1917 the coal was undercut by machine 3 to 4 inches above the fire-clay bottom and shot down with permissible explosive by miners and shot firers at any time during the shift. Sand and ashes were provided for stemming. There were 210 men employed underground. The coal was dumped over a wooden tippie and screened through bar screens with $\frac{3}{4}$ -inch and 1 $\frac{1}{4}$ -inch bars. Haulage was by six electric locomotives. There was track capacity for about 40 empty and 50 loaded railroad cars. The capacity of the mine was estimated to be 1,575 tons a day, and the actual daily average was 1,500 tons.

MONONGAH. CONSOLIDATION NO. 63 MINE.

Analyses 28322 to 28328 (p. 96). Bituminous coal, Fairmont field, from Consolidation No. 63 mine, a slope mine in Monongah, on the Baltimore & Ohio R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Bed is 6 to 7 $\frac{1}{2}$ feet thick; dip, about 2 per cent north. No faults are encountered, but there are occasional rolls or horsebacks. Roof, coal, 6 to 9 inches being left; floor, hard, smooth fire clay. The bed was sampled by E. H. Denny on May 11 and 12, 1917, as described below:

Sections of coal bed in Consolidation No. 64 mine.

Section..... Laboratory No.....	A. 28322	B. 28323	C. 28324	D. 28325	E. 28326	F. 28327
Roof, coal.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
"Sulphur" and shale.....		a 1 $\frac{1}{4}$				
Coal.....	1 9	2 2	1 6	1 9 $\frac{1}{2}$	2 1 $\frac{1}{4}$	1 9 $\frac{3}{4}$
Shale band.....	a 3 $\frac{3}{4}$	a 1	a 3 $\frac{3}{4}$	a 1 $\frac{1}{2}$	a 1	a 1 $\frac{1}{2}$
Coal.....	2	2	1 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$
Shale band.....	a 3 $\frac{3}{4}$	a 1	a 1	a 3 $\frac{3}{4}$	a 1 $\frac{1}{4}$	a 3 $\frac{3}{4}$
Coal.....	3	2 $\frac{3}{4}$	3 $\frac{1}{4}$	3	4 $\frac{1}{4}$	3
Shale band.....	a 3 $\frac{3}{4}$	a 1 $\frac{1}{4}$	a 1	a 1	a 3 $\frac{3}{4}$	a 1 $\frac{1}{4}$
Coal.....	2 0	4 2	2 10	4 4	3 10 $\frac{1}{2}$	2 9 $\frac{1}{2}$
"Sulphur".....	1 $\frac{1}{4}$		1 $\frac{1}{4}$		a 3 $\frac{3}{4}$	1 $\frac{1}{4}$
Coal.....	2 4		1 6		7 $\frac{3}{4}$	1 7 $\frac{1}{2}$
Bony coal.....	a 2					
Floor, fire clay.						
Thickness of bed.....	6 10 $\frac{1}{2}$	7 11	6 5 $\frac{3}{4}$	6 9 $\frac{1}{4}$	7 4 $\frac{1}{4}$	6 11
Thickness of coal sampled.....	6 6 $\frac{1}{4}$	6 8 $\frac{3}{4}$	6 3	6 7	7 1 $\frac{3}{4}$	6 8 $\frac{1}{2}$

a Not included in sample.

Section A (sample 28322) was cut from 8 room, pillar 2 south, off main. Section B (sample 28323) was cut from pillar, 8 room, 3 right, 4 north, off main. Section C (sample 28324) was cut from last breakthrough between entry and air course, 5 south, off main. Section D (sample 28325) was cut from 2 room, 7 left, 4 south, main. Section E (sample 28326) was cut from 8 room, neck, 2 right, 5 north, off main. Section F (sample 28327) was cut from 16 room, about 50 feet back from fall in crosscut, 2 left, 3 south, off main.

The ultimate analysis of a composite sample made by combining samples 28322 to 28327 is given under laboratory No. 28328.

System of mining, panel, room and pillar, In 1917 the coal was undercut by electric chain machines; cutting was done in the coal from 3 to 4 inches above the fire-clay bottom. Machine cuttings were usually loaded into cars before shooting. Holes were driven by electric auger drills mounted on the mining machine. Permissible explosive was used and shots were fired with a battery by shot firers in some sections, and in other sections, chiefly on pillars, by miners at any time during the day. Sand and ashes were generally used for stemming. None of the coal was shipped as run of mine. The coal was passed through bar screens having 1½ and ¾ inch openings. All coal passing through ¾-inch opening was coked, and some of 1½-inch and larger. The coal was cleaned on the cars by six pickers. Haulage was by five electric locomotives and by mules. There were three loading tracks, with capacity for 75 empty and 60 loaded railroad cars. The capacity of the mine was 1,500 tons a day, and the average production was 1,200 tons.

For descriptions and analyses of other samples from this mine see Bureau of Mines Bull. 85, pp. 121, 365.

WATSON. CONSOLIDATION NO. 26 MINE.

Analyses 28139 to 28144 (p. 96). Bituminous coal, Fairmont field, from Consolidation No. 26 mine, a drift mine at Watson, on the Baltimore & Ohio R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Bed is 6 to 8 feet 6 inches thick; dip, possibly 1° north. Faults and rolls or horsebacks are numerous. The bed contains three bands and occasional "sulphur" and clay veins. Roof, coal, 6 to 9 inches; floor, hard and reasonably smooth fire clay. The bed was sampled by E. H. Denny on April 27, 1917, as described below:

Sections of coal bed in Consolidation No. 26 mine.

Section.....	A. 28139	B. 28140	C. 28141	D. 28142	E. 28144
Laboratory No.....					
Roof, coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 4	1 7½	1 11	1 2	1 7½
Shale band.....	a 1	a 1	a 1	a 1	a ¾
Coal.....	2½	4	2½	3	2½
Shale band.....	a 1	a 1	a ¾	¾	a 1½
Coal.....	3	4	2¼	3	3¼
Shale band.....	a 1	a 2	a 1	a ¾	a 1½
Coal.....	3 6	3 6½	4 7½	4 6	4 2½
"Sulphur" band.....	1 ¼	1 ¼			
Coal.....	1 2	1 11			
Floor, fire clay.					
Thickness of bed.....	7 8¾	8 11	7 2	6 4½	6 8½
Thickness of coal sampled.....	7 5¾	7 9¾	6 11¼	6 2	6 4¼

a Not included in sample.

Section A (sample 28139) was taken at face of 14 room, off 4 right butt, off 5 north. Section B (sample 28140) was taken at face of 6 north, off river heading. Section C (sample 28141) was taken from 8 room, 2 butt, 8½ south, off main, at face of room. Section D (sample 28142) was taken from 15 room, 4 left butt, 7 south, off main. Sec-

tion E (sample 28144) was taken from 21 room, 5 left butt, 8 south, off main, 75 feet from room face, left rib (pillar coal).

The ultimate analysis of a composite sample made by combining samples 28139 to 28142 is given under laboratory No. 28143.

System of mining, room and pillar, in panels. In 1917 the coal was undercut by machine and shot down with permissible explosive any time during the day by shot firers or contractors. There were 156 men employed underground. The coal was dumped over a wooden tippie, most of the coal being loaded and shipped as run of mine. The coal was screened through bar screens having bars $1\frac{1}{2}$ inches wide. Haulage was by mules and five electric locomotives. There were two loading tracks, with capacity for 30 empty and a much larger number of loaded railroad cars. The daily capacity of the mine was 1,500 tons, and the average production was nearly 1,000 tons.

WORTHINGTON. CONSOLIDATION NO. 86 MINE.

Analyses 28535 to 28539 (p. 97). Bituminous coal, Fairmont field, from Consolidation No. 86 mine, a shaft mine 4 miles north of Worthington, on the Western Maryland R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Bed is 6 to 7 feet thick; dip, not noted. No faults or rolls encountered. Roof, roof coal, 4 to 12 inches being left up; floor, smooth, hard fire clay. The bed was sampled by E. H. Denny on May 25, 1917, as described below:

Sections of coal bed in Consolidation No. 86 mine.

Section..... Laboratory No.....	A. 28535	B. 28536	C. 28537	D. 28538
Roof, coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 $4\frac{1}{2}$	7 $\frac{1}{2}$	1 3	1 $6\frac{1}{2}$
"Sulphur" band.....	a $\frac{3}{8}$			
Shale band.....		a 1	a $1\frac{1}{2}$	a 1
Coal.....	2	2 $\frac{1}{2}$	1 $\frac{1}{2}$	2
Shale band.....	a $\frac{1}{2}$	a $\frac{1}{2}$	a 1	a 1
Coal.....	2 $\frac{1}{2}$	2 $\frac{3}{4}$	2 $\frac{3}{4}$	2 $\frac{1}{2}$
Shale band.....	a $\frac{3}{4}$	a $1\frac{1}{4}$	a $1\frac{1}{2}$	a $1\frac{1}{4}$
Coal.....	3 $\frac{1}{2}$	4 9 $\frac{1}{2}$	4 8	4 6
Shale band.....	a 1			
Coal.....	4 7			
Floor, fire clay.				
Thickness of bed.....	6 10	6 $\frac{3}{4}$	6 $7\frac{1}{4}$	6 $8\frac{1}{4}$
Thickness of coal sampled.....	6 7	5 $10\frac{1}{4}$	6 $3\frac{1}{4}$	6 5

a Not included in sample.

Section A (sample 28535) was cut near 2 face of east main, just inby 1 turned face entries. Section B (sample 28536) was cut at junction of 4 and 5 west main airways. Section C (sample 28537) was cut at 1 south face, off main west headings. Section D (sample 28538) was cut at 2 face of north faces, off east mains, just inby 2 pair of butts.

The ultimate analysis of a composite sample made by mixing samples 28535 to 28538 is given under laboratory No. 28539.

System of mining, room and panel. In 1917 the coal was undercut by machine and shot down with permissible explosive at any time during the shift by four shot firers. Men employed numbered 90 underground and 25 aboveground. The coal was dumped over a steel tippie. Haulage was by storage-battery locomotives. There were five loading tracks, with capacity for 70 empty and 70 loaded railroad cars. The daily average output of the mine in 1917 was 550 tons.

MARSHALL COUNTY.

BENWOOD. HITCHMAN MINE.

Analyses 25606 to 25611 (p. 97). Bituminous coal, Fairmont field, from Hitchman mine, a slope mine about 1 mile south of Benwood Junction station, on the Baltimore & Ohio R. R. Coal bed, Pittsburgh, or No. 8; Carboniferous age, Monongahela formation. Bed is 7 to 10 feet thick; dip, 75 per cent southeast, with cleat running south 15 east. The bed carries clay veins, and there are rolls or horsebacks in the roof. Impurities are two or three middle partings or bands, 1 inch thick, of shale, with about 4 inches of bony coal in between, and several "sulphur" partings in the bottom coal. Roof, immediate, 2 feet of roof coal with 10 inches of "draw slate" below; main roof, weak and dangerous, of soft shale; floor, hard and generally smooth, of black shale underlain with limestone. The bed was sampled by W. B. Plank on July 14 and 15, 1916, as described below:

Sections of coal bed in Hitchman mine.

Section..... Laboratory No.....	A. 25610	B. 25609	C. 25606	D. 25607	E. 25608
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof coal <i>a</i>	2 0	1 10	2 0	2 0	2 0
"Draw slate" <i>a</i>	1 1½	1 0	2 4	2 8	2 4
Coal.....	2 1	2 ½	2 1	2 6½	2 1
Bony coal <i>a</i>	½				
Shale band <i>a</i>		½	½	1½	½
Coal <i>a</i>	4				
Bony coal <i>a</i>		2½	4	4	5
Shale band <i>a</i>	1		½	1	½
Bony coal <i>a</i>		2			
Shale band <i>a</i>		¾			
Coal.....	2 10½	2 3	2 7	1 11	2 7
Dirt.....				1	
Coal.....				1½	
Bottom coal <i>a</i>		8		8	4
Floor, hard shale.					
Thickness of bed.....	7 6½	8 3¼	9 5	8 7½	7 9½
Thickness of coal sampled.....	4 11½	4 3½	4 8	4 8	4 8

a Not included in sample.

Section A (sample 25610) was taken from rib of 1 room, on 1 east, off 14 north. Section B (sample 25609) was taken from 4 room, on 18 west, off 12 south. Section C (sample 25606) was taken from face of 14 north, 50 feet in by 8 east. Section D (sample 25607) was taken from face 9 west, off 14 south, 12 feet from 14 south. Section E (sample 25608) was taken from 16 south, 30 feet from 2 main.

The ultimate analysis of a composite sample made by combining samples 25606, 25607, 25608, 25609, and 25610 is given under laboratory No. 25611.

System of mining, room and pillar. In 1916 the coal was undercut by electric breast machines and shot down with FFF black powder by the miners during the shift. About 280 men were employed underground and 45 aboveground. The coal was dumped over a steel tippie, all being shipped as run of mine. Forty per cent of the coal passed through bar screens which had 1½-inch and 6-inch openings. Haulage was done by four electric locomotives, with mules used for gathering. The coal was cleaned on the car by three pickers. There were three loading tracks, with capacity for 20 empty and 40 loaded railroad cars. The appearance of the lump coal and screenings on the cars was good. About 70 per cent of the coal was taken out in advance work, and the total recovery claimed was 70 per cent. The unmined area comprised 4,000 acres in 1916, and the estimated lifetime of the mine was 30 years. Daily capacity of the mine was 2,000 tons, and the average output was 1,800 tons. The production in 1915 was 525,000 tons. The entire output was sold to the Baltimore & Ohio R. R. for use on locomotives.

MERCER COUNTY.

COALDALE. COALDALE MINE.

Analyses 67890, 67897, 67905, and 29923; also average of tippie samples 70271 to 70274 (p. 97). Semibituminous coking coal, Pocahontas field, from Coaldale mine, a drift mine $\frac{1}{2}$ mile west of Coaldale station, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 9 to 12 feet thick; roof, hard shale and "draw slate," about 10 inches thick; floor, hard, smooth shale. The bed was sampled by R. H. Seip and S. P. Holt on December 19, 1917, as described below. Commercial samples were taken at the tippie by J. J. Bourquin on September 27, 1918.

Sections of coal bed in Coaldale mine.

Section..... Laboratory No.....	A. 67890	B. 67897	C. 67905
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 8	3 8 $\frac{1}{2}$	1 3
"Sulphur".....			a $\frac{1}{2}$
Bone.....	a 9	a 10	
Coal.....	5 2 $\frac{1}{2}$	5 3 $\frac{1}{2}$	2 4 $\frac{1}{2}$
Bone.....			a 6 $\frac{1}{2}$
Coal.....			3 6 $\frac{1}{2}$
Coal, gray.....			2
Coal.....			2 0
Floor, shale.			
Thickness of bed.....	9 7 $\frac{1}{2}$	9 10	9 10 $\frac{3}{4}$
Thickness of coal sampled.....	8 10 $\frac{1}{2}$	9 0	9 7 $\frac{1}{2}$

a Not included in sample.

Section A (sample 67890) was cut in Statley entry, off 7 left, 1 $\frac{1}{4}$ miles east of drift mouth. Section B (sample 67897) was cut in Keystone entry, off 7 left, 1 mile east of drift mouth. Section C (sample 67905) was cut in 5 entry, off main, 4,000 feet southeast of drift mouth.

The ultimate analysis of a composite sample made by combining samples 67890, 67897, 67905 is given under laboratory No. 29993.

System of mining, room and pillar. In 1917 the mine had been reached to its boundaries and the coal was all taken from pillars. It was shot down with permissible explosive and FFF black powder by the miners during the shift; it was undercut a little by hand. The haulage was by motor on the main line, and the cars were gathered by mule. The coal was all shipped run of mine and was picked on railroad car by two pickers. All impurities were loaded out of the mine, and the cleaning was done outside. Track capacity was 20 empty and 20 loaded railroad cars. There was no storage-bin capacity. The lumps on the cars were small. The capacity of the mine was 300 tons, and the actual daily average at time of sampling was 200 tons. The estimated lifetime of the mine was 6 years.

CRYSTAL. CRYSTAL No. 1 MINE.

Analyses 67984, 67986, 67988, and 29920; also car sample 29653 (p. 97). Semibituminous coal, Pocahontas field, from Crystal No. 1 mine, a drift mine 1 mile north of Crystal station, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 4 to 4 $\frac{1}{2}$ feet thick; dip of bed, slight; roof, "draw slate" and shale above; floor, shale with smooth surface. The bed was sampled by S. P. Holt, on December 27, 1917, as described below. Commercial samples were collected at the tippie by J. J. Bourquin on January 26, 1918.

Sections of coal bed in Crystal No. 1 mine.

Section..... Laboratory No.....	A. 67984	B. 67986	C. 67988
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	11½	1 6½	1 ½
"Sulphur".....	a ½	-----	a ½
Coal.....	4	-----	3½
Bone.....	a 3	a 2½	a 1½
Coal.....	2 4½	2 8½	2 8
Floor, shale.			
Thickness of bed.....	3 11½	4 5½	4 1½
Thickness of coal sampled.....	3 8	4 2½	3 11½

a Not included in sample.

Section A (sample 67984) was cut at face of 2 room, 3 cross entry, left. Section B (sample 67986) was cut at face of 14 room, 1 right. Section C (sample 67988) was cut on chain pillar in 20 room, hallway on 1 cross entry.

The ultimate analysis of a composite sample made by combining face samples 67984, 67986, and 67988 is given under laboratory No. 29920.

System of mining, room, and pillar. In 1917 the coal was undercut by machines and shot down by permissible explosives and black powder. Men employed numbered 90 underground and 50 on the surface, many of whom were at the coke ovens. Haulage was by three electric locomotives and by mules. None of the coal was shipped as run of mine. About half of the coal passed through the screens. The bar screens were 20 feet long and had 4½-inch wide openings; the small-coal screens had 1¼-inch, ¾-inch, and ⅝-inch openings. There were 8 to 10 pickers on tables. The coal was washed, nut and slack being produced; the screenings were coked. There were three loading tracks, with capacity for 15 empty and 40 loaded cars. The actual average shipments at time of sampling were 250 to 300 tons a day, with capacity for shipping 400 tons daily.

CRYSTAL. CRYSTAL NO. 2 MINE.

Analyses 68014, 68015, 68017, and 29975, also car sample 29655 (p. 98). Semibituminous coal, Pocahontas field, from Crystal No. 2 mine, a drift mine 1½ miles from Crystal, around the mountain, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 4 to 5 feet thick, dip, 1½ to 2° northwest; main roof, sandstone and shale; immediate roof, 6 feet of shale and 2½ inches of "muck," the latter coming down with the coal; floor, rough shale. No cleat, rolls, faults, or horsebacks were encountered in mining. Commercial samples of Crystal No. 2 coal were collected at the tipple by J. J. Bourquin on February 8, 1918. The bed was sampled by J. J. Bourquin and E. B. Sutton on December 14, 1917, as described below:

Sections of coal bed in Crystal No. 2 mine.

Section..... Laboratory No.....	A. 68017	B. 68015	C. 68014
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 7½	6	7½
Bone.....	a 6½	-----	-----
"Mother coal".....	-----	½	½
Coal.....	2 3½	7½	11½
Bone.....	-----	a 2	a 3
Coal.....	-----	6½	2 9½
Bone.....	-----	a 5½	-----
Coal.....	-----	1 11½	-----
Floor, rough shale.			
Thickness of bed.....	4 4½	4 3½	4 8½
Thickness of coal sampled.....	3 10½	3 8	4 5½

a Not included in sample.

Section A (sample 68017) was cut at face of 25 room, 6 entry. Section B (sample 68015) was cut in split on 1 pillar, 7 entry. Section C (sample 68014) was cut in 34 room, 6 entry.

The ultimate analysis of a composite sample made by combining face samples 68014, 68015, and 68017 is given under laboratory No. 29975.

System of mining, entry, room and pillar. In 1917 the coal was shot off the solid with FFFF black blasting powder. One electric locomotive was used. Impurities comprised clay and shale over the bed and bone in it. Particles of roof and of bone-coal bands became mixed with the coal in shipping. A 2½-inch band of muck immediately over the coal came down with it. Very little of the coal was shipped as run of mine. Shaking screens were used with pear-shaped openings 6 inches long and 4 inches wide, with a neck about 2 inches wide for upper half of hole. Small coal screens had 1½-inch round openings; slack was put through 1½-inch screens and also through a washery; the tonnage of washery was 150 tons a day. The coal was picked on tables and on cars by 10 pickers. There were two loading tracks. About 40 per cent of the coal was taken out in advance work. There were still about 300 acres to be mined, and the estimated lifetime of the mine was 15 years. Capacity of the mine was 400 tons a day, and the average daily production was 275 tons a day.

McCOMAS. SAGAMORE NOS. 1 AND 2 MINES.

Analyses 67911, 67952, and 67928 from No. 1 mine; 68013, 68012, and 68016 from No. 2 mine; also 29985 and 29986 and car samples 69016 and 69017 (p. 98). Semi-bituminous coal, Pocahontas field, from Sagamore Nos. 1 and 2 mines, drift mines ½ mile from Mora or McComas, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 4½ to 6 feet thick; dip, slight; no cleat; commercial samples were taken at tidewater by N. H. Snyder on March 11 to April 11, 1918. The bed was sampled by J. J. Bourquin on December 22 and 26, 1917, as described below:

Sections of coal bed in Sagamore Nos. 1 and 2 mines.

Section.....	A.	B.	C.	D.	E.	F.
Laboratory No.....	67911	67952	67928	68013	68012	68016
Roof, "draw slate".....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	10	9	11	1 0	11	1 3
Bone.....	a 2	a 3	a 1	a ½	a 3½	a 2½
Coal.....	3 10	3 4	3 6	1	6	3
Bone.....	a 2¾		a 1½	a 4	a 3½	a 3½
Coal.....			4	10	2 5	2 3
Bony coal.....		a 11		a 1		
Bone.....						a ½
Coal.....	11			4		
Bone.....				a ¾		
Coal.....				1 7½	a ½	
Floor, shale.....					1	1
Thickness of bed.....	5 11¾	5 3	4 11½	4 4¾	4 6½	4 4½
Thickness of coal sampled.....	5 7	4 1	4 9	3 10½	3 11	3 10

a Not included in sample.

Section A (sample 67911) was cut in No. 1 mine, 15 feet from face of crooked entries. Section B (sample 67952) was cut from left rib of 5 entry, at face. Section C (sample 67928) was cut at break through, 10 feet from face, 2 angle entry. Section D (sample 68013) was cut in No. 2 mine, 8 room neck, II-9 entry. Section E (sample 68012) was cut in last break-through, F-6 heading. Section F (sample 68016) was cut at face of 20 room, G-8 entry.

The ultimate analysis of a composite sample made by combining face samples 67911, 67952, and 67928 from No. 1 mine is given under laboratory No. 29985. The ultimate analysis of a composite sample made by combining face samples 68013, 68012, and 68016 is given under laboratory No. 29986.

System of mining, entry, room, and pillar. In 1917 in No. 1 mine the coal was undercut by pick, and in No. 2 mine it was undercut by machine and shot down by FFF black powder. There were 37 and 60 men employed underground and 5 and 35 on the surface, respectively. In No. 1 mine one electric motor and six mules were in use, and in No. 2 mine, seven electric motors.

Of the future tonnage of the mines 25 per cent was to be derived from pillar work and 75 per cent from advance work. No information was obtainable as to plans for future increase or decrease in production. Seventy-five per cent of the coal was shipped as run of mine; the other coal passed over shaking screens with openings as follows: $4\frac{1}{2}$ by 7 inches; $1\frac{1}{2}$, 2, and $2\frac{1}{2}$ -inch round holes. The egg and lump sizes went over picking tables, where eight pickers were employed. A tub washer was used. None of the coal was coked. There were three loading tracks, with capacity for 35 empty and 70 loaded cars. No. 1 mine had capacity for 600 tons, with average production at time of sampling of 300 tons a day; No. 2 mine had capacity for 1,500 tons, with average production of 600 tons a day.

McCOMAS. THOMAS No. 1 MINE.

Analyses 67906, 67907, 67908, 67912, 67914, and 29916 (p. 98); and car sample No. 29657. Semibituminous coal, Pocahontas field, from Thomas No. 1 mine, a drift mine at McComas, 1 mile from Mora station, on the Crane Creek branch of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3, Carboniferous (Pottsville) age, Pocahontas formation. Bed is 4 to 7 feet thick; roof, bad, composed of "draw slate," with sandstone above; floor, hard, smooth shale. There is a persistent 6-inch band of shale and bone at top of seam and 1 to 2 inches of bone 1 foot from top. Commercial samples of Thomas No. 1 coal were collected at the tipple by J. J. Bourquin on January 28 and 30, 1918. The bed was sampled by E. B. Sutton, J. J. Bourquin, R. H. Seip, and S. P. Holt on December 21, 1917, as described below:

Sections of coal bed in Thomas No. 1 mine.

Section..... Laboratory No.....	A. 67907	B. 67906	C. 67908	D. 67914	E. 67912
Roof, shale.....	<i>Ft. in.</i> <i>a</i> $\frac{3}{4}$	<i>Ft. in.</i> <i>a</i> $\frac{1}{2}$	<i>Ft. in.</i> <i>a</i> 1	<i>Ft. in.</i> <i>a</i> $\frac{1}{2}$	<i>Ft. in.</i> <i>a</i> $\frac{1}{2}$
Cube coal.....	11	9 $\frac{3}{4}$	1	11	11 $\frac{1}{2}$
"Mud".....				<i>a</i> $\frac{1}{2}$	<i>a</i> $\frac{1}{2}$
Coal.....	<i>a</i> 4	<i>a</i> 2 $\frac{1}{2}$	<i>a</i> 2 $\frac{1}{2}$		
"Sulphur".....	3 3	3 2 $\frac{1}{2}$	3	10 $\frac{1}{2}$	3 6 $\frac{1}{2}$
Bone.....				<i>a</i> 4	
Coal.....	<i>a</i> 11 $\frac{1}{4}$				
Bone.....				2 7	
"Bottom shale" (taken up).....					
Floor, shale.....	5 6	4 3 $\frac{1}{2}$	4 3 $\frac{1}{2}$	4 9 $\frac{1}{2}$	4 7
Thickness of bed.....	4 2	4 $\frac{1}{4}$	4	4 4 $\frac{1}{2}$	4 6
Thickness of coal sampled.....					

a Not included in sample.

Section A (sample 67907) was cut at face of pinnacle heading. Section B (sample 67906) was cut from 13 pillar, 22 entry. Section C (sample 67908) was cut at face of 11 room, off 2, 20 heading. Section D (sample 67914) was cut from 7 pillar, off 16 heading, off 2 main. Section E (sample 67912) was cut from face of 3 room, 18 heading, 22 main.

The ultimate analysis of a composite sample made by combining face samples 67906, 67907, 67908, 67912, and 67914 is given under laboratory No. 29916.

System of mining, entry, room, and pillar. In 1917 the coal was not undercut, but was shot off the solid with FFF black powder. Haulage was by one 13-ton and one 6-ton motor and by mules. A recovery of 95 per cent of the coal was claimed. There

were 70 men employed underground and 30 aboveground. The mine had four loading tracks, with capacity for 12 empty and 12 loaded railroad cars. The coal was mostly screened through 1, 2, and 3 inch openings. The coal was picked on the loading boom and on cars by eight pickers. The screenings were washed, 200 tons of $\frac{1}{4}$ and $1\frac{1}{2}$ inch sizes being put through the washery; about 150 tons were coked daily. The storage bins had capacity for 325 tons. The daily average output at time of sampling was 500 tons.

MATOAKA. THOMAS NO. 2 MINE.

Analyses 67909, 67968, 67963, 67913, and 29983; also tipple sample 29659 (p. 99). Semibituminous coal, Pocahontas field, from Thomas No. 2 mine, a drift mine, 2 miles west of Matoaka, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 4 to 5 feet thick; dip, $1\frac{1}{2}^{\circ}$. There are no faults, rolls, or horsebacks, but a characteristic bone parting at about the middle of the bed. Roof, soft "draw slate," with hard shale above; floor, hard, smooth shale. Commercial samples were collected at the tipple by J. J. Bourquin on February 6, 1918. The bed was sampled by R. H. Seip and S. P. Holt on December 22, 1917, as described below:

Sections of coal bed in Thomas No. 2 mine.

Section..... Laboratory No.....	A. 67909	B. 67968	C. 67963	D. 67913
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, cube.....	<i>a</i> $2\frac{3}{4}$	<i>a</i> $\frac{1}{2}$	<i>a</i> $\frac{1}{2}$	<i>a</i> $\frac{1}{2}$
Coal.....	11 $\frac{1}{2}$	4 3	11	10 $\frac{1}{2}$
Bone.....	<i>a</i> 2 $\frac{3}{4}$	<i>a</i> 1	<i>a</i> 2	<i>a</i> 3
Coal.....	3	4 $\frac{1}{2}$	3 6	3 6
Bone.....	<i>a</i> 1 $\frac{1}{2}$			
Coal.....	5			
Floor, shale.				
Thickness of bed.....	4 10	4 9	4 7 $\frac{1}{2}$	4 8
Thickness of coal sampled.....	4 5	4 7 $\frac{1}{2}$	4 5	4 4 $\frac{1}{2}$

a Not included in sample.

Section A (sample 67909) was cut at face of E entry, off B entry. Section B (sample 67968) was cut at face of D entry, off B entry. Section C (sample 67963) was cut on rib off A heading. Section D (sample 67913) was cut at face of 4 heading.

The ultimate analysis of a composite sample made by combining face samples 67909, 67968, 67963, and 67913 is given under laboratory No. 29983.

System of mining, entry, room, and pillar. In 1917 the coal was shot off the solid by FFF black blasting powder. There were 50 men employed underground and 16 on the surface. Haulage was by mules and one electric locomotive. Very little of the output was shipped as run of mine. The coal first went over shaking screens with pear-shaped holes $2\frac{1}{2}$ by $3\frac{1}{2}$ inches in size; then over small-coal screens with $1\frac{1}{2}$ and 1 inch holes. It was picked on table and cars by six pickers. The screenings were washed, producing fine coal, slack, and nut. The average daily tonnage washed was 100 tons; none was coked. There was storage-bin capacity for 150 tons. The lumps as shipped were large. The slack and nut could be separated by screens in washery, if desired. The track capacity was 20 empty and 15 loaded cars. No impurities were excluded in the mine, washing and picking being relied on for cleaning the coal. The general appearance of the coal was good. The output was being shipped to tidewater pool No. 2 for the Panama Railroad and to Portsmouth, Ohio. Average daily shipments were 300 tons in 1917. About half of the future tonnage of the mine was to be from advance work and half from pillars. The estimated life-time of the mine was 12 to 15 years.

SIMMONS. BOOTH-BOWEN MINE.

Analyses 67895, 67930, 67932, and 29910, also car samples 69018 and 69019 (p. 99). Semibituminous coal, Pocahontas field, from Booth-Bowen mine, a drift mine 2 miles northwest of Simmons, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Bed is 5 to 9 feet thick; dip, slightly to northwest; roof, shale; floor, hard, smooth shale. A commercial sample was taken on the cars by N. H. Snyder on February 21 and April 10, 1918. The bed was sampled by R. H. Seip and S. P. Holt on December 20, 1917, as described below:

Sections of coal bed in Booth-Bowen mine.

Section.....	A. 67895	B. 67930	C. 67932
Laboratory No.....			
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 4	11½	1 6
Bone and "sulphur".....	a 2¾	a 1¼	a 2
Coal.....	3 7½	2 9	1 7½
Shale.....	a 3		
"Sulphur".....		a ¾	
"Mother coal".....			¾
Coal.....	9	¾	1 11½
Coal, gray.....		2	
Shale.....			a 2
Coal.....		4	7½
Floor, shale.....			
Thickness of bed.....	6 2¼	8 7/8	6 1¼
Thickness of coal sampled.....	5 8½	7 11¼	5 9

a Not included in sample.

Section A (sample 67895) was cut at face of 10 room, off northwest cross air course, 3,900 feet northeast of drift mouth. Section B (sample 67930) was cut in new drift-section room pillar, 500 feet south of drift mouth. Section C (sample 67932) was cut in Klondike section, 16 room, 4,800 feet northwest of drift mouth.

The ultimate analysis of a composite sample made by combining face samples 67895, 67930, and 67932 is given under laboratory No. 29910.

System of mining, room and pillar. In 1917 the coal was undercut by pick and shot down by FFFF black powder by the miners during shift. Men employed numbered 65 underground and 25 aboveground. Pieces of roof or floor did not tend to become mixed with the coal in shipping. About 85 per cent of the coal was shipped as run of mine; the balance was screened over bar screens with 4½-inch openings and small bar screens with 2½ and ¾ inch openings. The coal was picked on railroad car by five pickers. Some screenings were coked, at the rate of 50 tons of coke a day. Capacity of storage bins was 150 tons slack, 50 tons egg, and 20 tons nut coal. The lumps were large. There was track capacity for 45 empty and 30 loaded cars. The lower shale band was thrown out by the miners underground. Thirty per cent of the coal was taken in advance work. Of the future tonnage 15 per cent was to come from advance work and 85 per cent from pillars. Tonnage was to be decreased gradually. Capacity of the mine, 1,000 tons a day; daily shipments at time of sampling, 300 tons; maximum day's run, 1,800 tons. The estimated lifetime of the mine was 25 years, there being 600 acres still to be mined.

For descriptions and analyses of other samples from this mine, see Bureau of Mines Bull. 22, pp. 277, 1029.

SIMMONS. BUCKEYE NOS. 1 AND 2 MINES.

Analyses 26707 to 26711, 26712 to 26718, 67961, 67893, 67931, 67981, 67983, 67982, 29921, and 29922; also car samples 69494 and 69495 (p. 99). Semibituminous coal, Pocahontas field, from Buckeye Nos. 1 and 2 mines, 2 miles northwest of Simmons, on the Norfolk & Western R. R. Coal beds, Pocahontas No. 3 and Pocahontas No. 6, respectively; Carboniferous (Pottsville) age, Pocahontas formation. No. 3 bed is from 4½ to 6½ feet thick; No. 6 bed is from 3½ to 4 feet thick. Dip of these beds is

slight. Roof of No. 1 mine, shale and sandstone; the shale varies from a knife edge to 6 inches in thickness; floor, shale and fire clay, generally smooth. Roof of No. 2 mine, "draw slate," 10 to 18 inches thick, with hard shale above; floor, hard, smooth shale. Material from the roof and floor did not become mixed with coal in mining. A commercial sample was taken from the cars at tidewater by H. W. Jarrett on May 2 to June 19, 1918. These mines were sampled by S. P. Holt and J. J. Bourquin on December 20 and 26, 1917, as described below:

Sections of coal beds in Buckeye Nos. 1 and 2 mines.

Section..... Laboratory No.....	A. 67961	B. 67893	C. 67931	D. 67981	E. 67983	F. 67982
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 0	2 6½	2 7½	3	2½	3½
Hard "sulphur" band.....	a ½	a 1				
Bone.....			a 7½	a ¾	a ¾	½
Coal.....	4½	6½	3 2½	3 4	3 6	3 3½
Bone.....	a 2	a 3¾				
Coal.....	2 10	2 9				
Floor, shale.						
Thickness of bed.....	5 4¾	6 2½	6 5½	3 7¾	3 9¼	3 7
Thickness of coal sampled.....	5 2½	5 9¾	5 10	3 7	3 8½	3 7

a Not included in sample.

Section A (sample 67961) was cut in No. 1 mine on 7 pillar, 1 parting, north entry. Section B (sample 67893) was cut in No. 1 mine on chain pillar, face of Simmons entry. Section C (sample 67931) was cut in No. 1 mine in 6 room, 7 cross entry, 10 feet from face. Section D (sample 67981) was cut in No. 2 mine, 1 left main heading, 300 feet from main. Section E (sample 67983) was cut in No. 2 mine in main heading, on cross entry, 500 feet from entry. Section F (sample 67982) was cut in No. 2 mine in heading on main, 1,300 feet from drift.

The ultimate analysis of a composite sample made by combining face samples 67961, 67893, and 67931 from Buckeye No. 1 mine is given under laboratory No. 29921. The ultimate analysis of a composite sample made by combining face samples 67981, 67982, and 67983 from Buckeye No. 2 mine is given under laboratory No. 29922.

The coal bed of No. 1 mine was sampled also by E. H. Denny on November 16 and 17, 1916, as described below:

Sections of coal bed in Buckeye No. 1 mine in 1916.

Section..... Laboratory No.....	A. 26712	B. 26713	C. 26714	D. 26715	E. 26716	F. 26717
Roof, "draw slate" or sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Impure coal and shale.....		a ½			a ½	a ½
Coal.....	7	6½	8½	1 1	8½	11
Coal, hard.....						3
"Mother coal".....		¼		⅙	⅙	
Impure coal and shale.....	1½		¼			
Coal.....	2½	3		1 3	6½	11
"Mother coal" or shale band.....	1½	¼		⅙	⅙	
Coal.....	2¼		1 6½		9	
"Mother coal," shale, and "sulphur" band.....	1½		a ¾		¾	
Coal.....	1 ½	1 3½	5		3	
Bony coal.....	a 5	a 3	a 4	a 4½	a 6½	a 3
Coal.....	2 5	1 2½	10½	3 2	2 7	2
"Mother coal".....	½	¾	½		¼	
Shale parting.....						
Coal.....	11	2 1	1 10		5	2 ⅙
"Mother coal".....						¼
Coal and shale.....		1½				
Coal.....		3				2
"Mother coal".....						1 ¾
Coal.....						1 ¾
"Mother coal".....						1 ½
Coal.....						1 ½
Floor, shale.						
Thickness of bed.....	5 9¼	6 1½	5 10	5 10½	5 10½	5 3½
Thickness of coal sampled.....	5 4½	5 10	5 5¼	5 6	5 3½	5 ⅙

a Not included in sample.

Section A (sample 26712) was measured on 3-room pillar from the daylight hole on the right of the north entry and 2,850 feet north 49° east from the drift mouth. Section B (sample 26713) was measured on 9-room pillar to the left of Price's entry and 1,875 feet north 10° west from the drift mouth. Section C (sample 26714) was measured in 4 room, 200 feet off, 3 right, and 5,475 feet south 25° east from the drift mouth. Section D (sample 26715) was measured on 6-room pillar 100 feet off Bennett's air course and 1,950 feet north 85° east from the drift mouth. Section E (sample 26716) was measured on the left, inby rib of 4 room, 160 feet from 5 cross entry and 4,050 feet south 56° east from the drift mouth. Section F (sample 26717) was measured at the face of 8 room, about 100 feet off Sinai air course and 6,075 feet south 77° east from the drift mouth.

The ultimate analysis of a composite sample made by combining samples 26712, 26713, 26714, 26715, 26716, and 26717 is given under laboratory No. 26718.

The coal bed of No. 2 mine was sampled also by E. H. Denny and W. B. Plank on November 17, 1916, as described below:

Sections of coal bed in Buckeye No. 2 mine.

Section..... Laboratory No.....	A. 26707	B. 26708	C. 26709	D. 26710
Roof, "draw slate".....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, blocky, impure.....	^a 6	^a 7	^a 6	^a 5
Coal.....	4	3 2	3 6	1 3½
"Mother coal" and shale.....	1 0 ½			1 5 ½
Coal.....	1 1 ½			1 ½
"Mother coal".....	2 ½			9
Coal.....	1 6 ½			
"Mother coal".....				
Floor, black shale.....				
Thickness of coal bed.....	3 7	3 9	4 0	3 11 ½
Thickness of coal sampled.....	3 1	3 2	3 6	3 6 ½

^a Not included in sample.

Section A (sample 26707) was measured at the face of 12 room, 120 feet off the main entry and 490 feet north 53° east from drift mouth. Section B (sample 26708) was measured at the face of air course, 800 feet north 31° east from drift mouth. Section C (sample 26709) was measured on the pillar of 7 room, 150 feet from the entry and 300 feet north 83° east from drift mouth. Section D (sample 26710) was measured on 3 pillar stump, next to 2 room neck, and 75 feet south 38° east from drift mouth.

The ultimate result of an analysis of a composite sample made by combining samples 26707, 26708, 26709, and 26710 is given under laboratory No. 26711.

System of mining, room and pillar. At time of sampling Nos. 1 and 2 mines the coal was mined by hand and shot down with FFFF black powder. Haulage in No. 1 was by steam locomotive and mule; in No. 2 by storage-battery locomotive. Carbide miners' lamps were used. In 1917 in No. 1 mine the coal was won mostly from pillars; the estimated lifetime of the mine was ten years; No. 2 derived 40 per cent of its tonnage from advance work and 60 per cent from pillars. There were 175 acres unmined, giving No. 2 an estimated lifetime of 10 years. About 60 per cent of the coal from No. 1 mine and all coal from No. 2 mine was shipped as run of mine. The rest of the coal from No. 1 mine was screened into lump, egg, nut, and slack; 90 to 100 tons were coked daily. Coal from No. 1 mine was picked over picking table by four men and occasionally by two men on the cars; coal from No. 2 mine was picked occasionally on a belt by two men. Track capacity of No. 1 mine, 77 empty and 26 loaded railroad cars; No. 2 mine, 15 empty and 15 loaded railroad cars. In 1916 the output of No. 1 mine was 600 tons a day. In 1917 the output of No. 2 mine was about 100 tons a day. Capacity of No. 1 mine in 1917 was 900 tons a day; in 1916 capacity of No. 2 mine was 125 tons a day.

For description and analyses of other samples of this coal see Bureau of Mines Bull. 22, pp. 277, 1028.

SPRINGTOWN. MODOC MINE.

Analyses 26701 to 26706, 26697 to 26699, and 26700 (p. 100). Semibituminous coal, Pocahontas field, from Modoc mine, a drift mine $1\frac{1}{2}$ miles northwest of Springtown, on the Wenonah branch of the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Average thickness of bed is about 4 feet 6 inches; bed lies practically flat; main roof, sandstone; immediate roof, shale; floor, sandstone. Material from the roof and floor did not tend to become mixed with the coal in mining. The bed was sampled by W. B. Plank on November 16, 1916, as described below. Four of these samples came from No. 1 drift, the other four from Nos. 2 and 3 drifts.

Sections of coal beds in Modoc mines.

Section..... Laboratory No.....	A. 26702	B. 26703	C. 26704	D. 26706	E. 26697	F. 26698	G. 26699	H. 26700
Roof, shale.....								
Coal, impure or "rash".....	<i>Ft. in.</i> <i>a</i> 2½	<i>Ft. in.</i> <i>a</i> 1	<i>Ft. in.</i> <i>a</i> ½	<i>Ft. in.</i>	<i>Ft. in.</i> <i>a</i> 2	<i>Ft. in.</i> <i>a</i> 2½	<i>Ft. in.</i> <i>a</i> 3	<i>Ft. in.</i> <i>a</i> 2½
Coal.....	9½	10½	3	11½	10	10½	11	11
"Mother coal".....	.....	.....	1	.....	.....	.....	.....	.....
Coal.....	.....	.....	3½	.....	.....	.....	.....	.....
"Mother coal".....	.....	.....	5	.....	.....	.....	.....	.....
Coal.....	.....	.....	.....	.....	.....	.....	.....	.....
Shale, hard, black	<i>a</i> 4½	<i>a</i> 4	<i>a</i> 4½	<i>a</i> 4	<i>a</i> 4	<i>a</i> 5½	<i>a</i> 5	<i>a</i> 7
Cube coal <i>b</i>	<i>a</i> 7	<i>a</i> 7	<i>a</i> 5½	<i>a</i> 9	<i>a</i> 7	<i>a</i> 4½	<i>a</i> 4½	.....
Coal.....	3	2 2	2 4	2 1	5	2 5½	2 3	2 7½
"Mother coal".....	½	.....	.....	.....	<i>a</i> ½	.....	.....	.....
Coal.....	5½	.....	.....	.....	.....	.....	.....	.....
"Mother coal".....	½	.....	.....	.....	.....	.....	.....	.....
Coal.....	4½	.....	.....	.....	.....	.....	.....	.....
"Mother coal".....	<i>a</i> 2	.....	.....	.....	.....	.....	.....	.....
Coal.....	10	.....	.....	.....	1 11	.....	.....	.....
Floor, sandstone.								
Thickness of bed.	4 1½	4 ½	4 3½	4 1½	4 3½	4 4½	4 2½	4 4
Thickness of coal sampled.....	2 9½	3 ½	3 5	3 ½	3 2	3 4	3 2	3 6½

*a*Not included in sample.

b Cube coal is a hard bone coal, which merges into the black shale, and between the two there is no easy dividing plane, which causes the coal to adhere to the shale. It is therefore thrown out by the miner, and consequently was excluded from the sample.

Section A (sample 26702) was measured at face of I right, off the mains, 400 feet from main entry and 475 feet north 40° east from drift mouth No. 1. Section B (sample 26703) was measured at face of I main, 1,200 feet north 9° west from drift mouth No. 1. Section C (sample 26704) was measured at the face of 5 room, off A entry left, 400 feet from the entry and 500 feet south 60° west from drift mouth No. 1. Section D (sample 26706) was measured on the pillar of 3 room, off B entry, 200 feet from entry and 825 feet north 26° west of drift mouth No. 1. Section E (sample 26697) was measured at the face of main, 200 feet from the north entry and 900 feet north 3° east from drift mouth No. 2. Section F (sample 26698) was measured at the face of the 6 left entry, 400 feet from the main entry and 1,075 feet south 80° east from drift mouth No. 2. Section G (sample 26699) was measured at the face of 8 left, 400 feet from the main and 900 feet north 60° east from drift mouth No. 2. Section H (sample 26700) was measured at the face of 5 room, off Q entry, 600 feet from the entry and 750 feet south 34° east from drift mouth No. 2.

The ultimate analysis of a composite sample made by combining face samples 26702, 26703, and 26704 from drift No. 1 mine is given under laboratory No. 26705. The ultimate analysis of a composite sample made by combining face samples 26697, 26698, 26699, and 26700 is given under laboratory No. 26701.

System of mining, room and pillar. In 1916 the coal was undercut by electric mining machines and shot down with FFF black powder. Haulage was by electric locomotive and mule. Carbide miners' lamps were used. At the time of sampling the output was about 400 tons a day; total capacity, 500 tons a day. The output was to be increased greatly, up to the capacity of the new 2,000-ton tippie which was being built. Future output was to come from advance work, the mine being a new one and in process of development. All coal was shipped as run of mine. The railroad cars were loaded at a temporary tippie. About 3,000 acres were to be mined from the openings.

WEYANOKE. WEYANOKE NO. 1 MINE.

Analyses 67965, 67936, 67966, and 29984; also car sample 30233 (p. 101). Semi-bituminous coal, Pocahontas field, from Weyanoke No. 1 mine, a drift mine, at Weyanoke, on the Norfolk & Western R. R. Coal bed, Pocahontas No. 3; Carboniferous (Pottsville) age, Pocahontas formation. Average thickness of bed is 4 to 4½ feet; bed is practically horizontal, except for a few local dips, and the cleat is well marked. No faults or horsebacks are encountered. Roof, 6 inches "draw slate," with shale and sandstone above; floor, 1 foot shale, with an occasional coal streak, sandstone or shale below. Commercial samples were taken at tidewater by N. H. Snyder on February 1 to 21, 1918. The bed was sampled by C. A. Allen on December 21, 1917, as described below:

Sections of coal bed in Weyanoke No. 1 mine.

Section.....	A.	B.	C.
Laboratory No.....	67965	67936	67966
Roof, "draw slate," "cube" shale or bone, ½ to 1½ inches ^a .	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 0	1 0½	1 1
Rock.....	^a 3½	^a 1½	^a 3½
Coal.....	2 10½	3 0	5½
Coal, gray.....			1
Coal.....			2 5
Floor, 1 foot poor coal and shale.			
Thickness of bed.....	4 2	4 2	4 4
Thickness of coal sampled.....	3 10½	4 ½	4 ½

^a Not included in sample.

Section A (sample 67965) was cut at face of 2 room, 18 right cross entry. Section B (sample 67936) was cut at face of 15 right. Section C (sample 67966) was cut at face of 13 left.

The ultimate analysis of a composite sample made by combining samples 67965, 67936, and 67966 is given under laboratory No. 29984.

System of mining, room and pillar. In 1917 the coal was cut on top by machine and shot down by black powder or permissible explosive by the miner during shift. Men employed numbered 225 underground and 39 on the surface. The tippie was of steel and wood. Haulage was by one 12-ton, one 3½-ton, seven 4-ton, and one 5-ton motor. About 20 per cent of the output was shipped as run of mine; the portion going to screens produced 48 per cent slack, 30 per cent lump, 12 per cent egg, and 8 per cent nut. The slack went through 1¼-inch round holes, the nut through 2½ by 3½ inch holes, egg through 3½ by 5 inch holes, and lump over 3½ by 5 inch holes. The coal was picked on a steel conveyor by 15 pickers. No screenings were coked. There was 50-ton storage bin capacity for slack and 30-ton bin capacity for nut. There were three loading tracks, with capacity for 31 empty and 32 loaded cars. In advance work 30 per cent of the coal was taken out, and there was a total recovery claimed of 94 per cent. There were about 960 acres still unmined, giving the mine an approximate lifetime of 25 years. The capacity of the mine was 1,500 tons a day; average output during time of sampling, 800 tons a day; maximum day's run, 1,800 tons.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 85, pp. 126, 375

MINERAL COUNTY.

EMORYVILLE. LOW VOLATILE NO. 1 MINE.

Analysis 69072 (p. 101). Semibituminous coal, Abram Creek-Stony River field, from Low Volatile No. 1 mine, $\frac{3}{4}$ mile southeast of Emoryville. Coal bed, Thomas (Bakerstown); Carboniferous age, Conemaugh formation. Thickness of bed and dip, not noted. Roof, black shale; floor, clay. The bed was sampled by G. H. Ashley on April 23, 1918, as described below:

Section of coal bed in Low Volatile Coal Co. mine.

	Ft.	in.
Roof, black shale.		
Coal, bony ^a	3	$\frac{1}{2}$
Coal.....	6	
Coal, bony ^a	8	
Coal.....	9	
Shale ^a		$\frac{1}{2}$
Coal.....	2	3
Floor, clay.		
Thickness of bed.....	4	6
Thickness of coal sampled.....	3	6

The section was measured at face of main entry, 500 feet from mine mouth.

HARRISON. OAKMONT MINE.

Analysis 69071 (p. 101). Semibituminous coal, Abram Creek-Stony River field, from Oakmont mine, 2 miles up Abram Creek from Harrison. Coal bed, Thomas (Bakerstown); Carboniferous age, Conemaugh formation. Thickness, dip, and cleat not noted. Roof very good, of shale; floor, clay. The bed was sampled by G. H. Ashley on April 23, 1918, as described below:

Section of coal bed in Oakmont mine.

	Ft.	in.
Roof, shale.		
Coal.....	11	
Shale ^a		$1\frac{1}{2}$
Coal.....		$5\frac{1}{2}$
Bone ^a		5
Coal.....	2	7
Floor, clay.		
Thickness of bed.....	4	6
Thickness of coal sampled.....	3	$11\frac{1}{2}$

The section was measured in 11 room, 13 right entry, 5,100 feet from mine mouth.

MINGO COUNTY.

THACKER. THACKER NO. 11 MINE.

Analysis 17482 (p. 101). Bituminous coal from Thacker No. 11 mine, 4 miles southeast of Thacker. Coal bed, Thacker; Carboniferous (Pottsville) age; Kanawha series. Bed at point of sampling is 5 feet $3\frac{1}{2}$ inches thick, clear coal, all included in sample. Part of the coal is splint. Sampled in room 1, on 5 left entry, off south entry, 1,000 feet from mine mouth, on June 5, 1913, by E. Stebinger.

^a Not included in sample.

THACKER. THACKER NO. 3 MINE.

Analysis 17484 (p. 101). Bituminous coal from Thacker No. 3 mine, 2 miles east of Thacker. Coal bed, Thacker; Carboniferous (Pottsville) age; Kanawha series. Bed at point of sampling is 5 feet 11 inches thick, clear coal, all included in sample. Part of coal was splint. Sampled in room 3, off 4 left entry, off main entry, 1,000 feet from mine mouth, on June 4, 1913, by E. Stebinger.

THACKER. THACKER NO. 5 MINE.

Analysis 17485 (p. 101). Bituminous coal from Thacker No. 5 mine, 2½ miles east of Thacker. Coal bed, Thacker; Carboniferous (Pottsville) age; Kanawha series. Bed at point of sampling is 5 feet 11 inches thick, clear coal, all included in sample. Part of coal was splint. Sampled in 14 room, 6 right entry, off main entry, 1,500 feet from mine mouth, on June 4, 1913, by E. Stebinger.

THACKER. THACKER NO. 9 MINE.

Analyses 17486 to 17488 (p. 101). Bituminous coal from Thacker No. 9 mine, 3½ miles east of Thacker. Coal bed, Thacker; Carboniferous (Pottsville) age; Kanawha series. Part of coal was splint. This mine was sampled on June 4, 1913, by E. Stebinger, as described below:

Sections of coal bed in Thacker No. 9 mine.

Section.....	A.	B.
Laboratory No.....	17486	17487
	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 7	3 7½
Shale.....	a 1	a 1
Coal.....	1 5	1 5
Thickness of bed.....	5 1	5 1½
Thickness of coalsampled.....	5 0	5 ½

a Not included in sample.

Section A (sample 17486) was cut at face of main entry, 1,200 feet from mine mouth. Section B (sample 17487) was cut at 7 right entry, off main entry, 700 feet from mine mouth.

The ultimate analysis of a composite sample made by combining samples 17484, 17485, 17486, and 17487 is given under laboratory No. 17488.

OHIO COUNTY.

ELM GROVE. ELM GROVE NO. 1 MINE.

Analyses 31621 to 31625 (p. 102). Bituminous coal, Wheeling district, from Elm Grove No. 1 mine, a slope and shaft mine at Elm Grove, on the Baltimore & Ohio R. R. Coal bed, Pittsburgh; Carboniferous age, Monongahela formation. Thickness of workable coal is 4 feet 6 inches to 5 feet 3 inches. Bed dips slightly southeast. A few rolls and "clay veins" are encountered. Impurities consist of two shale partings and some "sulphur" streaks. Roof, "draw slate" 3 to 18 inches thick; floor, smooth fire clay which becomes soft; limestone below. The bed was sampled by P. D. Browning on March 19, 1919, as described below:

Sections of coal bed in Elm Grove No. 1 mine.

Section.....	A. 31621	B. 31622	C. 31623	D. 31624
Laboratory No.....				
Roof, shale and "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 0	11½	6	6½
Bony coal.....			½	½
"Mother coal".....	½	½		
Coal.....	9	11½	7½	1 11
Bony coal.....	¾			
"Mother coal".....		½	½	
Coal.....	3	7	1 4½	
Bony coal.....	a ½	½	½	
Shale.....				½
Coal.....		2½	2	3
Shale.....		a ¾	a ½	a 1
Coal.....	1 4½	6	1 5	6
"Mother coal".....		½		½
Coal.....		1 1		1 0
"Sulphur stone".....	a ¾	a ½	a 1½	a ½
Coal.....	11	9	11	10½
Floor, fire clay.				
Thickness of bed.....	4 5½	5 3	5 2½	5 3
Thickness of coal sampled.....	4 3⅞	5 1¼	5 ½	5 1½

a Not included in sample.

Section A (sample 31621) was cut at left rib, 50 feet from face of 27 left butt. Section B (sample 31622) was cut at right rib, at face of 21 right butt. Section C (sample 31623) was cut at left rib, at face of main north. Section D (sample 31624) was cut at right rib, 35 feet from face, 27 right butt.

The ultimate analysis of a composite sample made by combining face samples 31621, 31622, 31623, and 31624 is given under laboratory 31625.

System of mining, double and triple entry, room and pillar, in panels. In 1919 the coal was undercut by machine in the bottom of coal and shot down with black powder, dynamite being used for "clay veins." Men employed numbered 60 underground and 14 aboveground. The tippie was of wood. Fifty per cent of the output was shipped as run of mine. The coal was screened through bar screens 12 feet long by 6 feet wide, with 1¼-inch spaces, and 45 per cent of the coal passed through the screens. Haulage was by two electric locomotives and by mules. Two pickers were employed on cars. There were three loading tracks, with capacity for 15 empty and 15 loaded railroad cars. The lump coal, in medium-sized lumps, presented a fairly good appearance on the cars. Sixty per cent of the coal was taken out in advance work, and the recovery claimed was 60 per cent. The unmined area included approximately 1,500 acres. The estimated lifetime of the mine was 30 years. At time of sampling the capacity of the mine was 809 tons a day, the average daily output 425 tons, and the maximum day's run 510 tons.

PRESTON COUNTY.**CORINTH. WILLS NO. 3 MINE.**

Analysis 26516 (p. 102). Bituminous coal from Wills No. 3 mine, ½ mile southwest of Corinth, on a switch of the Baltimore & Ohio R. R. Coal bed, Lower Kittanning; Carboniferous age, Allegheny formation. Bed is 3 feet 6½ to 7 inches thick; roof and floor, shale; cover at point of sampling, 120 feet. The bed was sampled by the Maryland Geological Survey on September 16, 1916, as described below:

Section of coal bed in Wills No. 3 mine.

Roof, shale.	Ft.	in.
Coal.....	1	3½
Shale ^a		1-1½
Coal.....	1	2
Bone and shale ^a		6
Coal.....		6
Floor, shale.		
Thickness of bed.....	3	6½-7
Thickness of coal sampled.....	2	11½-12

This sample was taken in 1 room, 1 right heading. At time of sampling the daily output was 50 to 60 tons.

KEMPTON. KEMPTON OR NO. 42 MINE.

Analysis 26578 (p. 102). Semibituminous coal from Kempton shaft or No. 42 mine, at Kempton, ¾ mile north of Beachwood station, on a spur of the Western Maryland R. R. Coal bed, Middle Kittanning; Carboniferous age, Allegheny formation. Bed is 10 feet 3½ inches thick; roof and floor, shale; cover at point of sampling, about 300 feet. The bed was sampled by the Maryland Geological Survey on October 30, 1916, as described below:

Section of coal bed in Kempton or No. 42 mine.

Roof, shale.	Ft.	in.
Coal.....	2	0
Shale ^a		2
Coal.....	3	0
Bone ^a		2
Shale ^a	1	1
Coal, dirty ^a		3
Shale ^a		5
Coal ^a		2½
Bone ^a		2½
Coal ^a	2	9½
Floor, shale.		
Thickness of bed.....	10	3½
Thickness of coal sampled.....	5	0

This sample was measured at face of main heading, 3,500 feet from shaft bottom. The daily output in 1916 was 800 tons.

RALEIGH COUNTY.

AFFINITY. AFFINITY MINE.

Analyses 68123, 68122, 68115, and 30169, 26691, 26692, 26693, 26694, and 26695 and carsamples 69148, 69149 (p. 102). Semibituminous coal, New River field, from Affinity mine, a slope mine at Affinity, on the Winding Gulf branch of the Virginian R. R. Coal bed, Beckley; Carboniferous (Pottsville) age, Quinnemont formation. Average thickness of coal is 3 to 4 feet; dip, about 1½° northeast; roof, sandstone and shale; where shale is encountered roof is bad in places; floor, shale. Pieces of the roof and floor did not become mixed with the coal in mining. A car sample was taken at tidewater by N. H. Snyder on March 18 to May 7, 1918. The coal bed was sampled by W. T. Lee on January 1, 1918, as described below:

^a Not included in sample.

Sections of coal bed in Affinity mine in 1918.

Section.....	A. 68123	B. 68122	C. 68115
Laboratory No.....			
Roof, sandstone and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 7	2 6	2 8
Shale.....	a 2	a 1	a 2
Coal.....	1 10	1 0	1 2
Floor, shale.			
Thickness of bed.....	3 7	3 7	4 0
Thickness of coal sampled.....	3 5	3 6	3 10

a Not included in sample.

Section A (sample 68123) was cut from pillar in 3 left crosseut, 1 south. Section B (sample 68122) was cut at face of 1 left, 1 north. Section C (sample 68115) was cut in dip heading off 1 west.

The ultimate analysis of a composite sample made by combining face samples 68123, 68122, and 68115 is given under laboratory No. 30169.

The coal bed was sampled also by E. H. Denny on November 14, 1916, as described below:

Sections of coal bed in Affinity mine in 1916.

Section.....	A. 26691	B. 26692	C. 26693	D. 26695
Laboratory No.....				
Roof, sandstone and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 3	2 3	2 7	1 2½
"Mother coal".....	½	½		½
Coal.....	10	3		5½
Bony coal.....	a 2¾	a 3	a 2½	a 3½
Coal.....	9½	1 1	8	11
"Mother coal".....	½			
Coal.....	4			
Bony coal.....	a 4½			a 3½
Coal.....	4½			5½
Floor, shale. ^b				
Thickness of bed.....	4 3	3 10½	3 5½	3 7½
Thickness of coal sampled.....	3 7¾	3 7½	3 3	3 7⅞

a Not included in sample.

b Second bone in sections A and D corresponds to floor in sections B and C.

Section A (sample 26691) was measured at the face of the air course of 1 right entry, off 2 north entry, and 2,425 feet north 75° east from slope mouth. Section B (sample 26692) was measured at the face of 2 west entry, 1,200 feet north 40° west from the slope mouth. Section C (sample 26693) was measured at the face of the fan entry, 1,550 feet south 60° west from the slope mouth. Section D (sample 26695) was measured on the right inby rib of old 2 south entry, about 50 feet outby 3 right entry and 2,425 feet north 75° east from the slope mouth.

The ultimate analysis of a composite sample made by combining samples 26691, 26692, and 26693 is given under laboratory No. 26694.

System of mining, room and pillar. In 1918 the coal was undercut by electric machines and shot down by permissible explosive. Brushing of roof and floor was also done with permissible explosive. Mine haulage was by electric motors. Carbide miners' lamps were used. At the time of sampling the output was 250 tons a day; about 1,000 acres were still to be mined, and 55 per cent of the future output of the mine was to come from advance work. All coal was shipped as run of mine. The coal was picked on the car by two trimmers. There was one loading track, with capacity for 14 empty and 25 loaded railroad cars. As shipped on car the coal contained about 70 per cent lump. The Affinity mine adjoins the Big Stick mine.

BIG STICK. BIG STICK MINE.

Analyses 68118, 68134, 68135, and 30167, and 26683 to 26689, and car samples 68806, 68807 (p. 103). Semibituminous coal, New River field, from Big Stick mine, a drift mine at Big Stick, on the Winding Gulf branch of the Virginian R. R. Coal bed, Beckley; Carboniferous (Pottsville) age, Quinnemont formation. Average thickness of coal is 4 to 6 feet; average of nine sections taken by the bureau is 5 feet 7 inches. The coal bed dips about 1½° northeast. Main roof, sandstone; immediate roof, "draw slate," floor, mostly hard, smooth clay. Material from the roof and floor did not tend to become mixed with the coal in shipping. Commercial sample was collected on the cars by N. H. Snyder on March 12, 1918. The bed was sampled by W. T. Lee on January 2, 1918, as described below:

Sections of coal bed in Big Stick mine in 1918.

Section.....	A.	B.	C.
Laboratory No.....	68134	68118	68135
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 5	5 4	3 3
Bone.....	1		a 3
Coal.....	2 7		2 1
Floor, clay.			
Thickness of bed.....	6 1	5 4	5 7
Thickness of bed sampled.....	6 1	5 4	5 4

a Not included in sample.

Section A (sample 68134) was measured in 3 right, 1 right air course, off 3 main. Section B (sample 68118) was measured in 2 right, 3 left, off 3 main. Section C (sample 68135) was measured in 8 right, 1 crosscut, off 1 main.

The ultimate analyses of a composite sample made by combining samples 68134, 68135, and 68118 is given under laboratory No. 30167.

The bed was sampled by W. B. Plank on November 14, 1916, as described below:

Sections of coal bed in Big Stick mine in 1916.

Sections.....	A.	B.	C.	D.	E.	F.
Laboratory No.....	26683	26684	26685	26686	26688	26689
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....			a 1			a 1
Shale.....			a 2	a 3		2
Bony coal.....						a ½
"Mother coal".....					a 2	
Coal.....	2 4½	3 1	1 8	2 1	2 1	2 1
Bony coal.....		a 5½				a 2½
"Mother coal".....	½		a ½	a 1½	a 3	
Coal.....	9	4	1 ½	6	6	11
Bony coal.....	a 3		a 4½	a 4½	a 4½	a 3½
"Sulphur".....		a 1				
Coal.....	9½	3	11½	1 4	1 5	1 5
"Sulphur," soft.....	½					
Dirt.....						a ¼
"Mother coal".....		a 1				
Coal.....	1 2	1 ½				1 0
Floor, fire clay.						
Thickness of bed.....	5 5	5 4	4 4	4 8	4 9½	6 1¼
Thickness of coal sampled.....	5 2	4 8½	3 8	3 11	4 0	5 5

a Not included in sample.

Section A (sample 26683) was measured on the rib of 10 room, off 4 left entry, 200 feet from the entry and 2,300 feet north 10° east from the drift mouth. Section B (sample 26684) was measured at face of 16 room, off 2 right, 300 feet from entry, and 3,700 feet north 35° east from drift mouth. Section C (sample 26685) was measured

at face of 3 right entry, off 3 main, 4,500 feet north 38° east from drift mouth. Section D (sample 26686) was measured 300 feet from face of 1 main, and 4,300 feet north 48° east from drift mouth. Section E (sample 26688) was measured on the pillar slant, off 9 room, off 4 right, 200 feet from entry and 3,850 feet north 22° east from drift mouth. Section F (sample 26689) was measured on a pillar of the straight entry, opposite 7 room, and 1,900 feet north 70° east from drift mouth.

Ultimate analysis of a composite sample made by combining samples 26683, 26684, 26685, 26686, is given under laboratory No. 26687. Ultimate analysis of a composite sample made by combining samples 26688 and 26689 is given under laboratory No. 26690.

System of mining, room and pillar. In 1918 the coal was undercut by electric cutting machines and was shot down by permissible explosive, which was used also for brushing roof and floor. Haulage was by electric motor. Carbide lamps were used. Average daily output in 1918 was about 500 tons, a large part of which came from pillars. The coal was all shipped as run of mine, and was picked on the railroad car. The lumps were mostly large. Track capacity was 40 empty and 40 loaded cars. About 1,000 acres of coal were still to be mined.

For description and analyses of other samples from this mine see Bureau of Mines Bull. 85, pp. 127, 378.

The mine was sampled in both 1916 and 1918.

MISTLETOE. LYNWIN MINE.

Analyses 68136, 68137, and 30148, and tipple samples 70283 to 70286 (p. 103). Semi-bituminous coal, New River field, from Lynwin mine, Kanawha-New River district, a drift mine at Mistletoe, near Winding Gulf, on the Virginian R. R. Coal bed, Beckley; Carboniferous (Pottsville) age. Quinnemont formation. Bed is 4 to 6 feet thick; dip, 2° or 3° northwest; no cleat or faults; roof, light-blue shale, which adhered more or less to the coal; floor, hard smooth shale, which did not become mixed with the coal in mining. Tipple samples were taken by S. S. Shirkey on September 27, 1918. The bed was sampled by E. W. Shaw on January 2, 1918, as described below:

Sections of coal bed in Lynwin No. 2 mine.

Section.....	A.	B.
Laboratory No.....	68136	68137
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 2	3 6
Bone.....	^a 2	^a 3
Coal.....	1	1 4
Floor, shale.....		
Thickness of bed.....	4 4	5 1
Thickness of coalsampled.....	4 2	4 10

^a Not included in sample.

Section A (sample 68136) was cut at face of 6 room, 2 left, in No. 2 mine; depth of cover at point of sampling, 150 feet; lies across creek from old opening. Section B (sample 68137) was cut in main heading of 7 right, 6,000 feet northwest of main entrance; cover at point of sampling, 300 feet.

The ultimate analysis is of a composite sample made by combining face samples 68136 and 68137 is given under laboratory No. 30148.

System of mining, room and pillar. In 1918 the coal was undercut by electric cutting machines and shot down with black powder and permissible explosive. The capacity of No. 2 mine was 400 tons a day, and the actual average at time of sampling was 200 tons. There were 40 men employed underground and 14 aboveground. There were two storage-battery locomotives, two trolley motors, and one gasoline motor.

The coal was all shipped as run of mine, and was picked on belt by two pickers. The lumps were of medium size. Some thin lenses of bone were shipped with the coal. There were about 3,000 acres to be mined, and the probable lifetime of the mine was 15 years.

OSWALD. OSWALD No. 3 MINE.

Analyses 68165, 68169, 68170, and 30156, and car samples 69099 and 69100 (p. 104). Semibituminous coal, New River field, from Oswald No. 3 mine, a drift mine at Oswald, on the Kanawha, Glen Jean & Eastern R. R. Coal bed, Sewell; Carboniferous (Pottsville) age, Sewell formation. Bed is 3 to 4½ feet thick; roof, 1 foot "draw slate," then 1 foot 10 inches of top coal, above which is shale; floor, hard, blue, shaly underclay with smooth surface. Commercial samples were taken at tidewater by N. H. Snyder on March 16 to April 29, 1918. The bed was sampled by C. A. Allen on January 7, 1918, as described below:

Sections of coal bed in Oswald No. 3 mine.

Section.....	A. 68170	B. 68165	C. 68169
Laboratory No.....			
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 10	1 8½	1 9
Coal, rashy.....	1		2
Bony coal.....		1½	
Coal.....	1 11	1 6¾	2 9
Bone.....	α 1		
"Mother coal".....		1½	
Coal.....		1 4	
Floor, clay.....			
Thickness of bed.....	3 11	4 9	4 8
Thickness of coal sampled.....	3 10	4 9	4 8

α Not included in sample.

Section A (sample 68170) was cut at face of 2 right, at 4 south. Section B (sample 68165) was cut at face of 5 room, 2 south, 1 right. Section C (sample 68169) was cut on 21 pillar, straight 7 entry.

The ultimate analysis of a composite sample made by combining samples 68165, 68169, and 68170 is given under laboratory No. 30156.

System of mining, room and pillar. In 1918 the coal was shot down with permissible explosives and undercut by machine. The mine had a modern steel tippie, with loading booms; one 10-ton, one 6-ton, and four 5-ton electric motors were used. Pieces of rock from roof and floor sometimes became mixed with the coal in shipping. In advance work 65 per cent of the coal was taken out. The coal was all shipped as run of mine. When coal was screened, shaking screens 5 by 12, with 4 by 5½ inch holes and 3 by 1½ inch and 1 inch holes were used. The coal was picked on car by two pickers. The coal was usually screened. In mining, only about 4½ feet of practically clean coal was taken; the "draw slate" and top coal were not removed. In places there is a thin streak of bone near the floor, and the machine cut on top of it. The capacity of the mine was 600 tons a day, and the average daily output was 400 tons, which was to be increased to 500 tons.

SLAB FORK. SLAB FORK Nos. 2, 3, AND 5 MINES.

Analyses 68154, 68156, 68161, and 30175 from No. 2 mine; analyses 68155, 68157, 68160, 68184, and 30176, also two samples of bone, analyses 68158, 68159, and 30177 from No. 3 mine; analyses 68152, 68150, 68151, and 30178 from No. 5 mine; car samples 68808 and 68809 (p. 104). Semibituminous coal, New River field, from Slab Fork Nos. 2, 3, and 5 mines, at Slab Fork, on the Virginian R. R. Coal bed, Beckley; Carboniferous (Pottsville) age, Quin nemont formation. Bed is 3½ to 7½ feet thick and dips about 2 per cent northwest. Main roof, good, a sandy shale containing about 3 inches of roof coal. There is some "draw slate," which falls, but parts from the coal. The

combined thickness of the shale and roof coal is 3 inches to 18 feet; above, in places, is a sandstone cap rock. Floor, hard, smooth shale. Material from roof and floor did not tend to become mixed with the coal in mining. A cleat in No. 3 mine runs north 50° west. There are a few faults and no horsebacks. There is a persistent streak of light bone in the coal as mined, otherwise the coal is clean; this bone coal is not picked out. Commercial samples were taken at tidewater by N. H. Snyder on March 16, 1918. The bed was sampled on January 4 and 5, 1918, by C. A. Allen and S. P. Holt as described below. Two samples of bone were taken in No. 3 mine.

Sections of coal bed in Slab Fork Nos. 2, 3, and 5 mines.

Section..... Laboratory No.....	A. 68161	B. 68156	C. 68154	D. 68160	E. 68184	F. 68155	G. 68150
Roof, "draw slate" and coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 10	4 1	1	3 8	1 10		
"Rash".....						a 1½	a 2¾
Bony coal.....	a 2½	a 3		a 3			
Shale.....			¼				a ½
Coal and "rash".....					4		
Coal.....	4½	11	11½	1 5	1 9	3 1	4 2½
"Mother coal".....			¼				
Bony coal.....					1		
Bone.....					a 2	a 5½	
Coal.....			3 0		3 0		
Bony coal.....			a 3				
Floor, shale.							
Thickness of bed.....	4 5	5 3	4 4	5 4	5 2	3 8	4 5½
Thickness of coal sampled.....	4 2½	5 0	4 1	5 1	5 0	3 1	4 2¼

Section..... Laboratory No.....	H. 68152	I. 68151	J. 68157
Roof, "draw slate" and coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
"Rash" and coal.....	a 2	a 2¼	
Bone.....	a 2½	a 3	
Coal.....	1 2½	1 1½	1½
Shale.....	a ½		
Coal.....	2 9		
Bone.....		a 2	a 1
Coal.....		2 8¼	3 7
Bone.....			a 4
Bony coal.....			5½
Floor, shale.			
Thickness of bed.....	4 4½	4 5	4 7
Thickness of coal sampled.....	3 11½	3 9¾	4 2

a Not included in sample.

Section A (sample 68161) was cut in No. 2 mine, at face of 11 room, 19 left. Section B (sample 68156), cut in No. 2 mine, at face of 9 room, 21 left. Section C (sample 68154), cut in No. 2 mine, in 22 right, 150 feet from main. Section D (sample 68160) was cut in No. 3 mine, in 19 room, A entry. Section E (sample 68184), cut in No. 3 mine, in 13 room, D entry. Section F (sample 68155), cut in No. 3 mine, main air course, at 10 right. Section G (sample 68150) was cut in No. 5 mine, at extension of 22 left, off 1 right off 21 left. Section H (sample 68152), cut in No. 5 mine, dip workings, 9 room, 19 right, off dip. Section I (sample 68151), cut in No. 5 mine, 6 room, 19 left entry. Section J (sample 68157), cut in No. 3 mine, 3 room, 5 right, off left panel. Sample 68159 represents bone partings excluded from section D and section E. Sample 68158 represents bone partings excluded from section F.

The ultimate analysis of a composite sample made by combining face samples 68154, 68156, and 68161 from No. 2 mine is given under laboratory No. 30175. The ultimate analysis of a composite sample made by combining face samples 68155, 68160, 68157, and 68184 from No. 3 mine is given under laboratory No. 30176. The ultimate analysis of a composite sample made by combining bone samples 68158 and 68159 is given under laboratory No. 30177. The ultimate analysis of a composite sample made by

combining face samples 68152, 68150, and 68151 from No. 5 mine is given under laboratory No. 30178.

System of mining, double entry, room and pillar. In 1918 the coal was undercut with shortwall mining machines and shot down with permissible explosives. The number of men employed were 56, 144, and 94 underground for Nos. 2, 3, and 5 mines, respectively, and 38 aboveground for Nos. 2 and 3 mines and 6 for No. 5 mine. Haulage was by electric motors and mules, there being 13 motors in all. The original area of No. 2 mine was 502 acres, of No. 3 mine, 2,006 acres, and of No. 5 mine, 348 acres. The coal bed is very clean except for a streak of light bone up to 3 inches thick which occurs up to a foot above the floor. In some places this is too close to the floor for machines to cut under it; then machine cuts on top of it and it is left in floor; where machine cuts under it, it goes with coal. The main roof is good; 6 or 8 inches of "draw slate" falls with the coal but is mostly gobbled. The capacity of No. 2 mine was 700 tons, of No. 3 mine, 800 tons, and of No. 5 mine, 600 tons. Actual average shipments in 1918 were 200, 560, and 425 tons, respectively. At the time of sampling about 93 per cent of the coal was shipped to Sewalls Point, where part of it was turned over to the Government and part shipped to the New England States. Part of the remainder was shipped to the Virginian R. R. The loading track capacity was as follows: Nos. 2 and 3 mines had a joint tippie; car capacity, 36 empty and 40 loaded railroad cars when railroad permits loads to stand on runaround track; car capacity at No. 5 mine, 14 empty and 14 loaded railroad cars. The coal was all shipped as run of mine, no screens being used. Nos. 2 and 3 mines had joint storage capacity for about 100 tons; No. 5 mine had no storage room. The coal was picked on cars, each mine having two pickers.

These mines were sampled in 1912.

For description and analyses of other samples see Bureau of Mines Bull. 85, pp. 129, 381.

TAMS. TAMS NOS. 1, 3, AND 4 MINES.

Analyses 68086, 68080, 68084, and 29973; also car samples 68804 and 68805 (p. 105). Semibituminous coal, Beckley field, from Tams Nos. 1, 3, and 4 mines, one large mine opened by drifts one-fourth mile east of station at Tams, on the Virginian and Chesapeake & Ohio Railroads. Coal beds, Main Beckley and Lower Beckley; Carboniferous (Pottsville) age, Quinnemont formation. The Main Beckley seam is 3 feet 8 inches to 6½ feet thick, the Lower Beckley 2 feet 2 inches to 3 feet 8 inches thick. The dip of the beds is irregular, up to 12 per cent. There is a faint cleat, and one fault 4,000 feet east of opening of No. 1 mine. Commercial samples were taken at tidewater by N. H. Snyder on March 12, 1918. The beds were sampled in Nos. 1, 3, and 4 mines by E. W. Shaw on January 1, 1918, as described below:

Sections of coal beds in Tams mines.

Section.....	A. 68086	B. 68084	C. 68080
Laboratory No.....			
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....		4 0	4 0
Coal with thin bone lenses.....	^a 2 8		
Bone.....	^b 2	^b 2	^b 3
Coal.....	1 2	2 0	1 0
Bone.....	^c 1 6		^b 1 0
Coal.....			1 4
Bone.....			^b 2
Coal.....			2 0
Floor, shale.....			
Thickness of bed.....	5 6	6 2	9 9
Thickness of coal sampled.....	3 10	6 0	8 4

^a Bone over ¾ inch excluded from sample.

^b Not included in sample.

^c Bone lying between seams not mined in this portion of mine.

Section A (sample 68086) was cut in No. 1 mine, face of 6 right, 1,500 feet south of mouth; depth from surface to point of sampling, 300 feet. Section B (sample 68084) was cut in No. 3 mine, face of air course, 6,000 feet southeast of opening, where cover is 300 feet over place of sampling. Section C (sample 68080) was cut in No. 4 mine, face of main, 800 feet north of drift mouth. Depth from surface to point of sampling, 150 feet.

The ultimate analysis of a composite sample made by combining face samples 68080, 68084, and 68086 is given under laboratory No. 29973. Laboratory No. 68086, which gives 6.2 per cent ash, is abnormal because of 2 feet 8 inches of coal laminated with thin bone lenses in section A.

System of mining, room and pillar. In 1918 two arc wall machines and one breast machine were used; all advance work, half of the output, was cut by machine and all pillar work was cut by pick. Bottom coal was to be mined later. The capacity of the four mines was 1,500 tons a day, which was equal to the maximum day's run; average shipments, 1,000 to 1,500 tons a day. There were 225 men employed underground and 75 on the surface. Haulage was by motor and by mule. At the time of sampling all coal was shipped as run of mine, but in normal times the coal is sized and marketed as lump, egg, nut, and slack. Shaker screens were used, and four men were employed on picking table. At the time the commercial samples were secured labor conditions were abnormal and coal was loaded without the care in cleaning that had prevailed. There was track capacity for 40 empty and 40 loaded cars on the Virginian R. R. and for 30 empty and 30 loaded cars on the Chesapeake & Ohio R. R.

TAMROY. TAMROY MINE.

Analyses 68166 to 68168 and 30159; also car samples 68843 and 68844 (p. 105). Semi-bituminous coal, New River field, from Tamroy mine, a drift mine at Tamroy, on the Kanawha, Glen Jean & Eastern R. R. Coal bed, Sewell; Carboniferous (Pottsville) age, Sewell formation. Bed is 3 to 4½ feet thick; dip, northwest; roof, 3 feet "draw slate"; floor, smooth shale. The coal has a cleat and occasional faults. Elevation above sea level, 2,100 feet. Commercial samples were taken at tidewater by N. H. Snyder on March 16 to 20, 1918. The bed was sampled by J. J. Bourquin on January 7, 1918, as described below:

Sections of coal bed in Tamroy mine.

Section..... Laboratory No.....	A. 68167	B. 68168	C. 68166
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 9		3 5½
Bony coal.....		^a 3 ¾	
Coal.....		3 ¼	
Bone.....		^a 1 ¾	
Coal.....		3 9	
Floor, shale.			
Thickness of bed.....	3 9	4 2¾	3 5½
Thickness of coal sampled.....	3 9	4 ¼	3 5½

^a Not included in sample.

Section A (sample 68617) was cut at face of 3 heading. Section B (sample 68168) was cut at face of 3 room, 4 south; depth of cover, 400 feet. Section C (sample 68166) was cut at face of 5 west.

The ultimate analysis of a composite sample made by combining samples 68166, 68167, and 68168 is given under laboratory No. 30159.

System of mining, room and pillar. In 1918 the coal was undercut by machine and shot down by permissible explosives. There were 85 men employed underground and 15 aboveground. Haulage was by electric motors, two main-line and seven

gathering. At time of sampling all coal was shipped as run of mine, but the mine was equipped to screen the coal over shaker screens with 4, 3½, and 1½ inch openings. Sizes of coal, lump, egg, and nut. The coal was picked on belt and on car by three pickers. There was a storage bin for slack coal with capacity for 150 tons. There were three loading tracks, with capacity for 25 empty and 25 loaded cars. In advance work 40 per cent of the coal was taken, and a total recovery of 85 per cent was claimed. There were about 1,000 acres still to be mined from this opening. The capacity of the mine was 1,000 tons a day, and the average production was 450 tons a day.

WOOD BAY. MACALPIN NOS. 1 AND 3 MINES.

Analyses 68259, 68260, and 30154; also car samples 68810 and 68811 (p. 105). Semi-bituminous coal, New River field, from MacAlpin Nos. 1 and 3 mines, one large mine, opened by drifts ¼ mile south of station at MacAlpin and ½ mile south of Woodbay station, on the Virginian R. R. Coal bed, Beckley; Carboniferous (Pottsville) age, Quinnemont formation. Bed is 3 to 6 feet thick; dip, 1½° northwest. Several faults and rolls or horsebacks are encountered in mining. Roof, shale 2 to 3 feet thick, containing streaks of coal; cap rock above; floor, hard, smooth, carbonaceous shale. Material from floor and roof did not tend to become mixed with the coal in shipping. Thickness of cover at points of sampling, 200 to 300 feet. A commercial sample was taken from the cars by N. H. Snyder on March 16, 1918. The coal bed was sampled by E. W. Shaw on January 2, 1918, as described below:

Sections of coal bed in MacAlpin mine.

Section.....	A.	B.
Laboratory No.....	68260	68259
Roof, shale.		
Coal, clean.....	<i>Ft. in.</i> 3 6	<i>Ft. in.</i> 4 2
Bone.....	a 2	
Coal.....	10	
Floor, shale.		
Thickness of seam.....	4 6	4 2
Thickness of coal sampled.....	4 4	4 2

a Not included in sample.

Section A (sample 68260) was cut in 16 room, 5 panel, 3 right, 3,600 feet south of main entrance. Section B (sample 68259) was cut in 7 room, 8 panel, 3 right, 4,500 feet south-southwest of main entrance.

The ultimate analysis of a composite sample made by combining face samples 68259 and 68260 is given under laboratory No. 30154.

System of mining, room and pillar and panel. In 1918 the coal was undercut by electric punchers and shot down by permissible explosives. Haulage was by four 13-ton electric locomotives and 13 gathering motors. The coal was all shipped as run of mine. The capacity of mine at time of sampling was 1,000 tons a day, and the average shipments were 500 tons a day, requiring 250 to 300 men underground and 15 on the surface. In May, 1919, the productive capacity was 1,500 tons per day and the average production was 1,000 tons a day. There were 1,300 to 1,400 acres still to be mined, and the estimated lifetime of the mine was 40 years. The coal was picked on belt and 200-foot table by four pickers. The coal as shipped appeared to be excellent, in medium-size lumps. There were two loading tracks, with capacity for 40 empty and 40 loaded cars.

Mine No. 1 was sampled in 1912. For description and analyses of other samples from that mine see Bureau of Mines Bull. 85, p. 131, 385.

RANDOLPH COUNTY.

LANESVILLE. OUTCROP MINE.

Analysis 69067 (p. 106). Semibituminous coal, Abram Creek-Stony River field, from outcrop mine near head of South Fork, Red Creek, above Lanesville. Coal bed known locally as Red Creek; Carboniferous age; unknown formation. Thickness, dip, and cleat of bed not noted. Roof, brown shale; floor, clay. The bed was sampled by G. H. Ashley on April 26, 1918. The sample represented 2 feet 7 inches of coal, the entire thickness of the bed. The section was measured at bare outcrop, faced back 3 or 4 feet.

WYOMING COUNTY.

ALPOCA. ALPHA MINE.

Analyses 68147, 68163, 68162, 68149, and 30166; also car samples 68841 and 68842 (p. 106). Semibituminous coal, New River field, from Alpha mine, a drift mine at Alpoca, $1\frac{1}{2}$ miles back on mountain from station, on the Virginian R. R. Coal bed, Beckley; Carboniferous (Pottsville) age; Quinnemont formation. Bed is 4 feet 10 inches to $7\frac{1}{2}$ feet thick; dip, 2 per cent northwest; roof and floor, sandstone. Commercial samples were taken on the cars by N. H. Snyder on March 19 to 21, 1918. The bed was sampled by J. J. Bourquin on January 5, 1918, as described below:

Sections of coal bed in Alpha mine.

Section	A. 68147	B. 68163	C. 68162	D. 68149
Laboratory No.....				
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 6	2 5	2 $1\frac{1}{2}$	1 2
Bony coal, or "rash".....	a 9	a $5\frac{1}{2}$	a 1 $3\frac{1}{4}$	
"Mother coal".....				$\frac{1}{4}$
Coal.....	2 $\frac{1}{2}$	1 $7\frac{1}{2}$	2 $7\frac{1}{2}$	8 $\frac{1}{2}$
Shale (not present in many places).....	$\frac{1}{2}$	$\frac{1}{4}$		
Shale.....				a 2 1
Coal.....	11	2 $9\frac{1}{4}$		2 6 $\frac{1}{2}$
Floor, sandstone.				
Thickness of bed.....	6 3	7 $3\frac{1}{4}$	6 0	6 $6\frac{1}{4}$
Thickness of coal sampled.....	5 6	6 10	4 $8\frac{3}{4}$	4 $5\frac{1}{4}$

a Not included in sample.

Section A (sample 68147) was cut 40 feet from face of 22 room, off main entry. Section B (sample 68163) was cut from pillar in 5 room, off 3 air course. Section C (sample 68162) was cut 10 feet from face of 36 room, off main. Section D (sample 68149) was cut 50 feet from face of cross-entry heading.

The ultimate analysis of a composite sample made by combining face samples 68147, 68163, 68162, and 68149 is given under laboratory No. 30166.

System of mining, entry room and pillar. In 1918 the coal was undercut in the coal 2 to 4 feet from top by machine. It was shot down with permissible explosive during the shift by the miners. There were four coal-cutting machines, two main-line motors, and four reel-and-cable motors. Mules were used for gathering. About one-fifth of the tonnage was to come from pillars and the rest from advance work. The cutting was done just above the "middleman;" after coal above was shot down and loaded out, parting was loaded out and gobbed; then lower part of seam was mined. There was one loading track, with capacity for 14 empty and 14 loaded railroad cars. The coal was all shipped as run of mine. There were no screens in the wooden tipple. The coal was picked on car by two pickers. The capacity of the

mine at time of sampling was 800 tons a day, and the average daily output was 650 tons. There were 65 men employed underground and 13 aboveground. There were still about 450 acres to be mined from this opening, and the estimated lifetime of the mine was 50 years.

WYOMING.

LINCOLN COUNTY.

ELKOL. ELKOL MINE.

Analyses 30735 and 30762 (p. 106). Subbituminous or lignite coal, Kemmerer field, from Elkol mine, a slope mine at Elkol, about 6 miles southwest of Kemmerer, on the Oregon & Short Line R. R. Coal bed, Elkol; Cretaceous age, Frontier formation. Bed is 1 foot 8 inches to 6 feet 8 inches thick. The bed contains two ½-inch rock bands, one 14 feet above floor and the other 14 feet below roof; dip, 16° west. Occasional faults are encountered. Roof, soft, friable sandstone; floor, coal. Above this coal are a number of coal seams 6 to 25 feet thick, said to total 300 feet. Cover at points of sampling, about 650 to 700 feet. The bed was sampled by C. A. Allen and K. T. Sparks on June 5 and 6, 1918, as described below:

Sections of coal bed in Elkol mine.

Section.....	A. 30735	B. 30762
Laboratory No.....		
Roof, shale and soft sandstone above roof coal.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	5 0	22 3
Rock.....	^a ½	.....
Coal.....	8 11½	.....
Floor, coal.		
Thickness of bed ^b	14 0	22 3
Thickness of coal sampled.....	13 11½	22 3

^a Not included in sample.
^b Fourteen feet of thickness was sampled, but coal in roof and floor and vein is from 20 to 80 feet thick.

Section A (sample 30735) was cut in 6 room, 1 south entry. Section B (sample 30762) was cut in 21 room, 3 north entry.

System of mining, room and pillar. In 1918 the coal was cut by machine in entries only and shot off the solid with black powder at any time by the miners. Giant powder was used for brushing roof or floor. There were 65 men employed underground and about 6 aboveground. The tippie was of wood and well equipped with screens. The sizes of coal depended on the market. Haulage was by mules. About 20 per cent of the total coal was taken out in advance work, and the percentage of recovery was low. The estimated lifetime of the mine was very long. At the time of sampling the daily capacity of the mine was approximately 1,500 tons, the actual average being 650 tons.

SUBLET. KEMMERER NO. 5 MINE.

Analyses 30793 to 30797 (p. 107). Bituminous coal, Green River field, Kemmerer from No. 5 mine, a slope mine located at Sublet, on a spur of the Oregon Short Line R. R. Coal bed, No. 5, or Willow Creek; Cretaceous age, Frontier formation. Bed is 5 to 6 feet; dip, 15° to 20° west, with cleat running slightly east of north. At the top there is a thin streak of bone and rock that sometimes falls with the coal. No rolls or horsebacks are encountered in mining. Roof, shale, weak in upper part; sandstone below; floor, smooth, fairly soft, of shale; cover at points of sampling, 600 to 1,200 feet. The bed was sampled by C. A. Allen on June 15, 1918, as described below:

Sections of coal bed in No. 5 mine.

Section..... Laboratory No.....	A. 30793	B. 30794	C. 30795	D. 30796
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, soft.....	1 0			
Coal, very hard.....	2 0			
Coal, soft.....	2 5			
Coal.....		<i>a</i> $\frac{1}{2}$		
"Sulphur" band.....		<i>a</i> 1		
Sand rock, soft.....			$1\frac{1}{2}$	
Coal, dirty.....	<i>a</i> 1		<i>a</i> $1\frac{1}{2}$	
Rock, soft.....			<i>a</i> $\frac{1}{2}$	
Coal.....		2 10 $\frac{1}{2}$	5 8	5 6
Coal with two $\frac{1}{8}$ -inch lenses of "sulphur".....		6		
Coal.....		2 0		
Floor, soft clay.....				
Thickness of bed.....	5 6	5 6	5 10	5 6
Thickness of coal sampled.....	5 5	5 4 $\frac{1}{2}$	5 8	5 6

^a Not included in sample.

Section A (sample 30793) was cut 20 feet south of neck, 46 room, 7 north entry. Section B (sample 30794) was cut 15 feet south of neck, 70 room, 6 south entry. Section C (sample 30795) was cut 45 feet from main slope, 9 south, back entry. Section D (sample 30796) was cut at face of 8 south entry, 11 room.

The ultimate analysis of a composite sample made by combining face samples 30793, 30794, 30795, and 30796 is given under laboratory No. 30797.

System of mining, room and pillar. In 1918 the coal was shot off the solid and shot down with black powder by the miners twice daily. Giant powder was used for brushing roof or floor. The tippie was of wood. Haulage was by five electric locomotives and by mules. Less than half the coal was taken out in advance work, and the percentage of recovery claimed was high. The average daily output was 850 tons.

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INDEX.

This index gives the names of places at or near which samples of coal mentioned in this bulletin were collected. In addition, it gives the names of many coal beds, including names of geological significance, as well as some that are merely local, and the names of most of the mines.

Attention is called to the fact that many beds opened by prospect pits, country banks, or by mines, especially in the Rocky Mountain province, have no names, even local ones. Moreover, many such local names as "A," "B," "1," "2," "Upper," "Lower," have been omitted to reduce the length of the index and to avoid the confusion that would result from applying the same designation to different beds.

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